GIFTED CHILDREN

HOLLINGWORTH

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GIFTED CHILDREN: THEIR NATURE AND NURTURE

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By LETA S. HOLLINGWORTH, Ph.D., Associate Professor of Education, Teachers College, Columbia University.

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THEIR NATURE AND NURTURE

BY

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TO THE MEMORY

OF

MY GRANDPARENTS

SAMUEL THOMAS DANLEY

MARY BLAIR DANLEY

PREFACE

Nearly all we know about gifted children has been learned through investigations of the past ten years. A decade ago it would have been impossible to write the book which these pages introduce. The literature of experiment dealing with unfortunate deviates — the stupid, the delinquent, the dependent — has long been voluminous; but the literature dealing with fortunate deviates was until recent years chiefly legendary.

This preoccupation with the incompetent resulted from the natural tendency of human beings to notice whatever is giving them pain or annoyance, taking for granted that which proceeds in an orderly and agreeable manner. It was due also to the wave of uninformed humanitarianism, which rose in the latter half of the eighteenth century, and extended through the nineteenth century. Under this influence, expensive and even palatial institutions were established for the preservation and care of the feebleminded, the delinquent, the crippled, the insane, and others who varied biologically in the direction of social incompetence. Philanthropy, originally meaning love of man, degenerated to mean love of stupid and vicious man. These efforts were, of course, actuated by the emotionally satisfying doctrine that all human beings are or might be born equal in merit; and that money, education, surgery, medicine, and faith can eventually uplift any and all to the desired level of behavior.

Humanitarianism, which has supported the scientific study

of unfortunate deviates, has now been to some extent informed of the fact that many problems apparently of education or economics are essentially problems of biological heredity and variation. The result of this information has appeared in the past ten years in many ways, one of which is the granting of funds for the study of gifted children. We owe much of the knowledge set forth in this volume to private foundations, established to promote human welfare. In 1918, the General Education Board financed for one year the investigation of Dr. Whipple at Urbana. At about the same time, The Public Education Association of the City of New York assigned the services of a psychologist for the purpose of studying gifted children at Public School 64, Manhattan. Approximately five years later, The Commonwealth Fund gave much larger sums than those appropriated by previous donors, to support the monumental work of Dr. Terman in California; and this subvention was matched by Stanford University for the same purpose. In 1922, The Carnegie Corporation granted money through Teachers College, to make possible an experiment in the education of gifted children in New York City, which was carried on for three years by a joint committee of investigators, at Public School 165, Manhattan, under the principalship of Mr. Jacob Theobald. It is to these appropriations that we owe most of our present knowledge of gifted children as organisms.

Public funds also have been utilized for the study of the gifted, wherever educators have undertaken experimental classes in public schools. Money has thus been spent toward the welfare of the exceptionally competent in all the cities to which reference is made throughout the present volume. To experiments thus supported we owe much of our present knowledge about the school progress of the gifted and about the relative success of various methods of selection.

The appropriations both of private and of public funds thus spent for the gifted are, of course, very small as compared with the millions of dollars being given for the guidance and promotion of the incompetent. Nevertheless, they indicate the onset of change to a healthier social psychology. In fostering this benign change, educators have, perhaps, the greatest opportunity and duty of all professional groups.

Leta S. Hollingworth

Teachers College
Columbia University
June, 1926

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EDITOR'S INTRODUCTION

The subject that Dr. Hollingworth treats in this volume is a timely one. It has recently come to engage a large part of the attention, not only of psychologists and educationists but also of laymen. If nature really endows some children intellectually much more generously than she does others — and the data presented in this volume will convince any fair-minded person that this is the case — the fact is of importance to those who are interested in social advancement as well as to those teachers and parents who are striving to do the best they can for each individual committed to their care. The present writer can easily recall the time when everyone thought that "bright" children could look out for themselves — as a result of which opinion they were neglected, in the schools at any rate, in order that teachers might devote all their energies to the less able and the backward pupils. The view generally held in those times was that it would be best for the group as well as for the individual to keep all children in a school class at as near the same level as possible in intellectual development; or at least, to make a supreme effort to lift up the lowly so that there would not be too great a gap between them and those of their companions who could push ahead more rapidly if encouraged to do so.

A few years ago one rarely heard that social progress depended mainly upon the discovery and development of the gifted child; or that well-endowed individuals have a right to receive as much attention from teachers and society

in general as less-favored children. But our views on these matters have changed fundamentally. The question of the desirability of discovering and developing to the utmost all our superior children has been pretty generally decided in the affirmative, so that we can now expend our energies in devising instruments for locating highly-endowed children and in determining how best to bring their talents to fruition so that, without any overlooking of their personal interests and well-being, they may become most useful to society.

Dr. Hollingworth's book treats the problems involved in a convincing and illuminating manner. There is presented herein the kind of evidence that a psychologist, a teacher, a parent, or a lay reader would wish to see with respect to the frequency of gifted individuals in the whole group of children; the traits exhibited by those who possess superior ability — whether they are physically below or above par and temperamentally eccentric or stable and normal — how they respond to educative influences; how they are regarded by their associates and their teachers; and, most of all, what kind of educational régime seems best adapted to their powers and their needs.

Dr. Hollingworth has included a large amount of scientific material in her book; but she has presented it in a straightforward, clear, interesting manner; and it may be predicted that this volume will be read easily and with complete comprehension by parents, teachers, and laymen as well as by students of human development and of education. The author combines in an unusual degree scientific acumen, exactitude, and adequacy, with clarity and literary grace.

M. V. O'Shea

The University of Wisconsin
June, 1926

Nothing is so great a service, nothing so great a gift, as to give another an opportunity for a task worth while and the achievement of that success which comes in the doing.

— William H. Burnham

GIFTED CHILDREN

CHAPTER I

History of the Study of the Gifted

I. THE RECOGNITION OF SUPERIOR PERSONS

The existence of superior persons is recognized and has always been recognized, so far as we know, among all peoples. It is popularly supposed, under the social theories current among us, that "nature peoples" live in a state of equality with one another, but anthropologists realize that such is not the case. Lowie, for example, points out to us that "Primitive man is no imbecile; he is quick to perceive and appraise those individual differences which as an inevitable biological phenomenon mark every group, even the lowest." Anthropologists see among savages not only social caste, but also "vital distinctions on the basis of personal desert."

In barbaric society, historians find the noble and the royal castes developed as means of distinguishing the best and their offspring. While a people is slowly rising into its first mastery over crude environment, "he who can is king," and those who are stronger, more enduring, and more capable of selective thinking than the average man become "the nobles" of the group. Average men spontaneously yield their homage, because they urgently need the protection which "the noble man" can extend to all who become "his men."

It may be alleged by those who are loath to believe the teachings of differential psychology, that the superiority thus recognized among our barbarous ancestors was of brawn only (for nearly everyone admits that there are superiorities and inferiorities of physique). High caste in barbaric society was, however, very probably won by all-round superiority. Thus physical superiority undoubtedly played a part, but that this was the only, or even the primary, factor seems extremely improbable. A gorilla has great superiority of brawn, but men do not look to his leadership in times of stress and peril. The capacity to grasp the elements of a situation, to aim effectually at solution of a problem, to foresee and to invent, must have been of primary importance to our barbaric ancestors, as with us.

In contemporary civilization we see the breakdown of hereditary castes of the best which had their beginnings in barbaric society. Why this happens we shall consider in a later chapter. We may be sure that the decay, like the development, of these castes originated in human nature — in the laws that govern its manifestations. In many modern civilized nations men are now sociologically and legally equal, in civic theory. In practical life, however, biological inequality is recognized in very many ways. For instance, modern men, both voluntarily and involuntarily, allow more money to the more gifted, which eventuates as inequality of earnings. Modern civilization bestows medals, appointments, professional, political, and military titles upon its best performers.

It is clear that people always, even when their theories are aggressively democratic, create aristocracy within their group. They establish honors and rewards for those members who comprehend the conditions of life more effectively than their fellows, and who translate their understanding more fluently with tongue or hand. Why does this inevitably

come about? What determines best performance? What are the factors of abiding eminence?

II. SUPERSTITIONS ABOUT GENIUS

Many centuries ago words embodying the concept of mental superiority appeared in language. "Genius" and "talent" are examples of such words. One who shows a wonderful capacity for mental performance is called a "genius." In general, "talent" means a remarkable ability, falling short, however, of the superlative.

The amazing capacity which men call genius lies so obviously beyond the range of average men as to seem supernatural to them. The contemplation of genius thus came to be accompanied by a kind of superstitious awe, and the notion gained currency that people of genius constitute a separate species, semi-divine, perhaps, or at least not sharing merely the endowment of ordinary mortals. This superstition is analogous to that which classifies the feebleminded as a separate species, divided from the mass of mankind by some definite distinguishing mark. Men of average ability, constituting the great majority of mankind, view members of the species as apart from themselves in nature, when they are born to a certain degree inferior or superior in any respect. Special names are invented to designate these supposed separate species. In the case of extremes in stature, we have "dwarf" on the one hand, and "giant" on the other. So very great is the range of difference among men in intelligence, that the typical man cannot comprehend how a member of his own species could be as stupid as the one he calls "imbecile," or as wise as the one he calls "genius." He can only explain the differences by believing that these extreme deviates are of a "different kind," belong to "a different race."

The average man thus fails, from inherent causes, to follow

the working of a mind greatly superior to his own. This failure results not only in the form of superstition to which we have just referred. It may also result in persecution of the genius and even in his destruction by the multitude. Whether a genius be called divine or devilish depends upon his diplomacy, the nature of the ideas he attempts to convey, and the beliefs cherished in his time.

The best intellects find meaning in subtle elements of situations, which are far too abstract to have meaning for the average mind. Even when these meanings are pointed out, they may not be comprehended by the majority. Thus the intellect which first responded to those subtle signs which tell that the earth is round was persecuted and mocked by those who were less intelligent.

How, then, can we know when the mind of another really comprehends a situation, which is to us incomprehensible? This is the riddle of the relationship between the gifted individual and the people of his day. It is no wonder that genius has been regarded with superstition, benevolent or malevolent according to circumstances.

III. SCIENTIFIC STUDY OF THE EMINENT

The most important early attempts to proceed by taking nothing for granted, and in this frame of mind actually to collect and study data about superior persons, were those of Galton, in England, beginning about 1865. Galton amassed facts about adults who had attained notable distinction in the world's work and play — judges, writers, statesmen, musicians, scholars, wrestlers. He studied these facts with a view to determining degrees of eminence, the frequency of persons in the various degrees, and why some persons become eminent while others do not.

As a result of his studies, Galton concluded that the pro-

portion of possible great men in a given population is limited by nature and can be approximately foretold from generation to generation; that there are numerous degrees of eminence, the frequency of persons who attain each degree decreasing markedly as the degree becomes greater; and that only a very few can achieve the highest status which we call "illustrious."

These facts were related by Galton, in his thinking, to the frequency tables which mathematicians have shown to result when a large number of causes or factors act together in countless ways, as in a game of chance. One who plays games of chance, as with dice, or cards, knows that mediocre combinations turn up very frequently, while very low or very high combinations are rare. These same laws have already been seen to hold for organisms, in the case of physical traits like weight or stature or length of middle finger. Everyone will agree after a little reflection that most people are close to medium in height, and that very tall or very short persons occur but rarely. The taller or shorter they are, the more rarely are they found. Clothiers recognize these laws, without explicitly knowing them, and stock their shelves accordingly. A man who departs even a little from average has some difficulty in being fitted. A man two feet tall cannot buy ready made garments, nor can one who is nine feet tall, because both occur so infrequently that it would be poor business for a clothier to carry such sizes.

Galton deduced from his studies that ability to rise above the average in achievement follows the same general laws of frequency as stature and weight. Most men are of medium ability. Diverging from them, on the one hand, are those of better than average ability and, on the other hand, those of less than average ability. The farther a person diverges from medium ability, in either direction, the less frequently will those like him occur in the world.

We shall return again to these laws of biological nature. They may be illustrated for the moment, schematically, as in Figure 1. We have pictured here the middle mass of persons, who because they are so numerous determine the typical ability of their species. The tapering of the mass toward two opposite extremes represents the increasing scarcity of those who are "more" and "less," as compared with average.

Galton further concluded that the eminent have a greater number of eminent relatives than would be expected by chance. He regarded this as evidence that mental ability is inherited, conditioned by ancestry, as physical traits rather obviously are. He realized, however, that his data were ambiguous, for it could be contended that the eminence of a man with eminent relatives might be a result merely of their social influence. Therefore, Galton sought to gain light from further sources. He reasoned that if this were so, and if eminent performance were due primarily to opportunity, the adopted sons of superior persons should equal in accomplishment the children produced by parents equally well placed.

Popes are extremely eminent and able persons, who frequently adopt boys as sons, particularly their own nephews. A pope is in position to give great opportunities to an adopted son. But Galton discovered that these adopted children, even the nephews, by no means equal the real sons of superior men, in respect to eminence attained.

Building upon Galton's work, several scientific investigators have studied the natural history of the eminent during the past fifty years. We must note the chief findings of these investigators of our subject. Cattell, in seeking to study superior ability, chose American men of science, living between 1900 and 1915. Such men are properly to be studied in this connection, because it is certain that in order to achieve official recognition as a man of science, one must be far above the

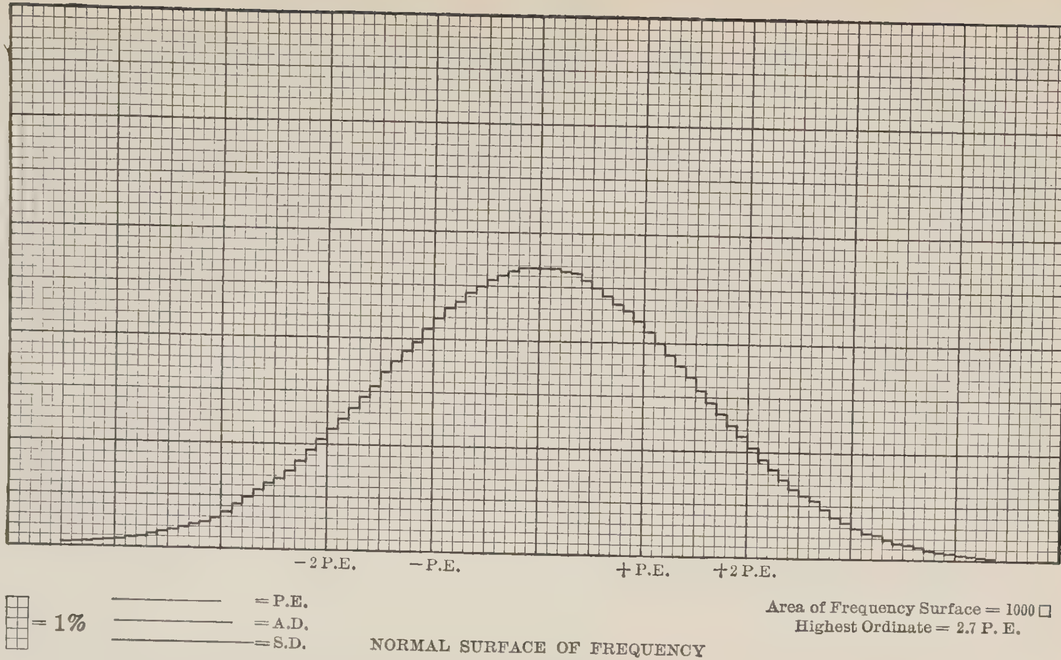

FIG. 1. — Showing how a large group of persons will be distributed along a scale of merit, if submitted to measurement or test. For clarification see also Figures 2, 3, and 4.

average in capacity for selective thought. Among men of science, however, there are only a few who reach the superlative rank. Most scientists approximate, but do not reach, the uttermost extreme of human genius. Cattell selected for his special study the thousand men of science, most eminent according to the judgment of their contemporaries.

It was found that these intellectual workers constitute a very small proportion of the total population, and that various sections of the country contribute very unequally. The most able American men of science are derived largely from fathers in the professions. Laborers' children are almost never found among them. Scientists originate largely in cities, not on farms, as is popularly supposed. Cattell says:

> The professional classes have contributed in proportion to their numbers about fourteen times as many scientific men as the others, the agricultural classes only half as many as the manufacturing and trading classes. The farm not only produces relatively fewer scientific men, but a smaller proportion of them are of high distinction and a larger proportion are in the lowest group. This traverses a common belief. . . . In proportion to their population, cities have produced twice as many scientific men as the country.

Of leading scientific men in England, studied by Galton about 1874, none came from artisan or peasant parentage. DeCandolle discovered that of one hundred men distinguished as foreign associates of the Paris Academy of Sciences, 41 came from noble and wealthy families, 52 came from the middle class, and only 7 from the manual workers, though the latter are very numerous in the population. Odin found that of 823 French men distinguished in letters, 65 per cent originated in the governing classes including the nobility, 23 per cent in professional families, 12 per cent in the commercial classes, and 16 per cent from the remainder of the population. Ellis found that of 829 British men of genius, 18.5 per cent were of noble or wealthy parentage, 41.3 per cent came from profes-

sional circles, 31.2 per cent from parents engaged in commerce, 6 per cent from yeomen and farmers, and 2.5 per cent from artisans and laborers.

The manual laborers outnumber the nobility in England a hundred times but produce only a quarter as many children who in adulthood achieve eminence for mental work. This and many of the other facts which have been stated above are contrary to popular belief. The very exceptionality of the rise of a man to extreme eminence from the humblest ranks of life is sufficient to fix it in the public attention, so that it is remembered where more usual cases are forgotten. In this way develops an illusion that most eminent persons have been poor in youth.

In all of these statistical studies it was found that few women can be included in any category of adults who have achieved eminence through mental gifts. In a study of the thousand most famous persons in the history of human endeavor, Cattell was able to include but a few women. Even of those to whom sufficient space was given in historical accounts, many were distinguished only by a kind of bad eminence, as having murdered, or been murdered, or the like. Castle, who later made a study of the world's most eminent women, could find comparatively few who reached top rank through exercise of their own genius.

One more investigation must be cited here, which has the merit of keeping the factor of environment constant, as Galton did in comparing the adopted sons of popes with real sons of other eminent men. This is Woods' study of achievement among the members of royal families. Persons born into the various royal families of Europe have, roughly at least, the same kinds of opportunity. Woods shows, however, that this approximate sameness of environment and opportunity has by no means brought about equality of achievement in the

various families studied. Greatness "runs in families," despite similarity of opportunity for all.

Recently information has been compiled regarding the origin of persons listed in the 1922–1923 edition of *Who's Who in America*. Eminent Americans of the present day are very similar in derivation to the eminent of other times and places. Replies obtained from about four-fifths of those still living when requests for information were sent out show that 25.9 per cent were born on farms, 24.5 per cent in villages, 24.8 per cent in small cities, 20.6 per cent in large cities, and 4.1 per cent in suburbs. In proportion to the population as distributed in 1870, when these people were being born, cities contributed nearly six times as many as did farms, while villages contributed nine times, and suburbs eleven times as many, respectively.

As regards paternal occupation, when the offspring subsequently eminent were born, 70 per cent of the fathers belonged to the professional or business classes, 34.3 per cent and 35.3 per cent, respectively. The fathers were farmers in 23.4 per cent of cases; skilled or semi-skilled laborers in 6.3 per cent of cases; and unskilled laborers in .4 per cent of cases.

Basing comparison on the distribution of frequency in various occupations as existing in 1870, fathers in the professions had a value of 1400 in the production of those eminent in our own time; fathers in business, a value of 600; in farming, of 70; in skilled and semi-skilled manual labor, of 30; and in unskilled labor, of 1. Fathers who had reached the professions were 1400 times as likely to have offspring of distinction as were fathers in unskilled labor. The clergymen of 1870 had a very special value as fathers of notables, having fathered 2400 times as many of those at present eminent as did the unskilled manual laborers of their time.

IV. CONFLICTING INTERPRETATIONS OF THE FACTS

Those who investigate eminence agree, therefore, upon the following facts. An overwhelming majority of illustrious persons have had fathers who were far above the average in social-economic conditions — nobles, professional men, or men successfully engaged in commerce. Very few children of manual workers become eminent in high degree, either in old settled countries or in the United States. The cities produce many more of those who become eminent than the country does (except for the châteaux of France). Very few women can be included among those who in the world's history have achieved first rank for mental work.

These facts, standing alone, obviously admit of conflicting interpretations, so that they do not advance far toward unequivocal knowledge of mental superiority. One possible interpretation is that education and opportunity are the prime determinants of achievement, since nearly all of the great men have been born in comfortable homes, of parents in superior circumstances. If opportunity were indeed the prime determinant of eminence, then we should expect those who belong to socially inferior categories to be virtually excluded from it. This is just what we do find, since the uncultured, the poor, servants, and women are very seldom found to have achieved eminence.

The most exhaustive arguments for this interpretation are those of Ward, who has secured many followers among educators and philanthropists in this country. A recent article by an educator will serve to state this point of view, and to show that by no means may it be relegated to the past tense. Howerth says, in the *Educational Review* for January, 1922:

As Ward truly says, "So far as the native capacity, the potential quality, the promise and potency of a higher life are concerned, those

swarming, spawning millions, the bottom layers of society, the proletariat, the working classes, the hewers of wood and drawers of water, nay even the denizens of the slums . . . are by nature the peers of the boasted aristocracy of brains that now dominate society and look down upon them, and the equals in all but privilege of the most enlightened teachers of eugenics."

This interpretation appeals strongly to our prejudices, since each of us wishes to believe himself "by nature the peer of the boasted aristocracy of brains." Being biased, thus, in favor of this attitude, we should consider with special care whether the facts admit of other interpretation. The facts do admit of quite different explanation, as has been clearly set forth by Galton, Pearson, Woods, Davenport, and Thorndike.

This different explanation of the facts is as follows: If children inherit their mental abilities through their parents, and if inherited ability is the prime determinant of achievement, then we shall expect to find almost all eminent persons to have been born of parents above average in social status. Through centuries of competitive effort, the most able will in the long run have come to occupy the most comfortable places. If it is desirable to be titled, to follow the professions, to own and manage property, to get the rewards of the city, then after the long run of the centuries a large majority of the best thinkers will be titled, professional, proprietors, and in the city. It follows that their children will be born under the conditions which they have wrought for themselves, or which they have inherited from their own parents, and that these children will themselves be superior, as a group, if "like begets like." The close correlation between eminence and superior opportunity may just as well be explained, therefore, on the hypothesis that able parents create both good living conditions and superior children; that opportunity and eminence are not causally related, except in so far as both are referable to a common cause — able parents.

The interpretation last cited readily takes care of all categories of those who furnish few or none of the eminent, except one. Women furnish few persons of great eminence, yet sisters of great men are of exactly the same ancestry as their brothers. If inherited ability, and not opportunity, is the primary condition of greatness, and if sisters are not great, yet have the same ancestry as their illustrious brothers, their failure must be explained on some basis other than lack of opportunity. In fact, a great variety of hypotheses have been brought forward to cover this point in thinking. We shall consider some of these in a later chapter.

A ground midway between the two interpretations which we have cited is represented by Cattell, who says:

> It is evident that what a man can do depends on his congenital equipment. How far what he does do depends on his environment and how far on his congenital equipment, or how far his congenital equipment depends on that of his parents and his family line of descent, we do not know. . . . A boy from the professional classes in New England has a million chances to become a scientific leader, as compared with one chance for a negro girl from the cotton fields.
>
> These great differences may properly be attributed in part to natural capacity and in part to opportunity. When it is asked how far the result is due to each of these factors, the question is in a sense ambiguous. It is like asking whether the extension of a spiral spring is due to the spring or to the force applied. Some springs cannot be extended a foot by any force; no spring can be extended without force. The result depends on the relation between the constitution of the spring and the force applied.

An adequate historical account of our subject must include mention of certain reports by students who unfortunately have lacked the requisite knowledge of method, which would have enabled them to avoid gross error. These reports have, nevertheless, had as wide and perhaps wider currency than others. Lombroso is the most conspicuous example of this group of students.

Citing certain illustrious persons, Lombroso puts forward the theory that the most notable correlation of genius is with

insanity, and other disorders of mind and nervous system. He, and others who follow him, have started with a theory and have then looked for illustrative examples, selected to prove it. This is a violation of scientific method, which prevents truth from appearing. The question whether there is a relationship between genius and insanity could be answered only by a method of investigation laboriously different from the selection of cases to prove the point. Of a large number of men of superior intellect or talent, chosen alphabetically let us say, how many were insane as compared with the proportion of insane among mediocre and untalented men of equal age? This question Lombroso and others who have reported a relationship between genius and insanity have never answered. Their theories are noticed by modern students of genius only because they have constituted a phase in the history of the subject, not because they are helpful to us.

V. EVALUATION OF STUDIES OF EMINENCE

The underlying purpose of the studies which we have summarized was to discover facts about mentally superior individuals. For this purpose these studies clearly show many inherent defects of material and of method. In the first place, eminence and superior mental ability are not identical. We may certainly agree with Cattell that what a person *can* do depends on his congenital equipment; but we must also agree that we do not, from studies of eminent adults, know how far what he actually *does do* depends on his environment. "A Darwin born in China in 1809 could not have become a Darwin, nor could a Lincoln born here on the same day have become a Lincoln had there been no Civil War." Furthermore, it is highly probable, to say the least, that personal qualities other than intellect or talent act strongly as determinants of accomplishment. To study the eminent is, therefore, doubt-

less to study but a selected group of the mentally superior — those who have also been favored with at least a reasonable or "survival" amount of health, character, and opportunity. Intellect can create, to a certain extent, opportunity, character, and even health, but hardly in every case to a degree insuring eminence. In studying eminent adults it is not possible either to bring forward negative instances or to prove that they do not exist. If a man of superior ability fails, he does not become known, and hence cannot be pointed out by either party to the controversy.

Something here depends on the manner in which we consent to define "genius." If we mean by "a genius" one who is very superior in every respect, intellectually, morally, physically, and also in regard to special talent if art or music is being considered, then no doubt we may suppose with Galton that there is a very powerful tendency for such a person to become eminent.

> It follows that the men who achieve eminence and those who are naturally capable are, to a large extent, identical. . . . If a man is gifted with vast intellectual ability, eagerness to work, and power of working, I cannot comprehend how such a man should be repressed.

Many thinkers would, however, object to including physical stamina and strength of character as elements of genius.

Moreover Galton did not really subscribe to that unimportance of environmental conditions which his statement here appears to imply. For instance, he recognized that a man of genius with a large family cannot run quite the same course as one of equal capacity who is unencumbered.

> A very gifted man will almost always rise, as I believe, to eminence; but if he is handicapped with the weight of a wife and children in the race of life, he cannot be expected to keep as much to the front as if he were single. He cannot pursue his favorite subject of study with the same absorbing passion as if he had no pressing calls on his attention, no domestic sorrows, anxieties and petty cares, no yearly child, no periodical infantine epidemics, no constant professional toil for the maintenance of a large family.

Galton also recognized that common ground is lacking for a comparison of men with women as to ability. This would not be so if nothing but ability counts toward achievement.

> I do not attempt to compare relations within the first degree of kinship — namely fathers with mothers, sons with daughters, or brothers with sisters — because there exists no criterion for a just comparison of the natural ability of the different sexes.

Aside from these limitations, whereby negative instances cannot be adduced, the nature of the data concerning the known is in most of the studies unsatisfactory. Biographical data are subject to many kinds of error. Biographies and autobiographies, written at the end of life or after death, are notoriously subject to distortions of memory and of sentiment.

The study of eminent adults has thus left us with an array of facts, interesting but ambiguous. Capable parents, superior homes, good education, and offspring who attain eminence are all closely associated. From this association as such we cannot, however, determine cause and effect. Early investigators have, as we have seen, perceived these ambiguities, and have tried to clarify them. But by the methods available in their state of knowledge, it was very difficult to do this, because there was no proof of genius save eminence. This proof takes a lifetime, and is besides subject to all the causes of unreliability already discussed. The two studies which tend most effectively to real knowledge of the true source of performance are those by Galton, of adopted sons of popes, and by Woods, of royal families. In these two studies opportunity is, roughly, kept constant, and yet we see that accomplishment varies according to ancestry.

However, in order finally to clear away the uncertainties, and to gain information which would serve as a secure basis for action, as in education, it is necessary to observe gifted persons directly and to know them in childhood. Until very

recently there has been no method of identifying superior children. One investigator, Yoder, has made a careful attempt to study the childhood of great men, through biographical data, and his results have interest for us, though subject to all the sources of error already cited.

VI. THE CHILDHOOD OF GREAT MEN

Yoder published his studies in 1894. He made a systematic survey of biographies of the great, to find data relating to childhood. He thus traced out certain uniform facts about the childhood of fifty great persons. From these facts he was able to arrive at the following generalizations.

The child who will become a great man may be born at any time, over practically the whole range of the reproductive period, in the lives of the parents. The mothers of the fifty studied ranged in age from 18 to 44 years, when the great man was born, with a median at 29.8 years. The fathers ranged in age from 23 to 60 years, with a median at 37.7 years.

The average number of siblings (brothers and sisters together) of these persons was 5^+, not including half brothers and sisters.

In families of more than one child, a strong tendency was found (chances of nearly two to one) for the great man to occur in the elder half of the siblings.

Of those listed, seventeen were only sons, either by accident of birth or by death of brothers. (This is not to say that they were only children.)

Unusual height was mentioned quite frequently in description. There was found no evidence that the great were sickly or physically weak in childhood, to a more marked extent than average.

Play interests were keen among these children, though often the play was of an unusual kind. "Solitary play" is repeat-

edly described. Of Emerson his biographer says, "I don't think he ever engaged in boy's play, not because of any physical disability, but simply because from earliest years he dwelt in a higher sphere." Others are said to have been "disinclined to general intercourse." Instead of joining in the usual childish games, Newton preferred to play with his machines, Darwin with his collections, Shelley to read, Stevenson to make clay engines, and Edison to mix his chemicals. Of Byron, it was written, "The love of solitude and of meditation is already traceable in the child. He loves to wander at night among the dark and solitary cloisters of the abbey." Yoder remarks that "solitude seems to have played a rather striking rôle in the lives of these great men. Either by nature or by opportunity, they stayed a great deal alone."

Nevertheless, many of the fifty especially enjoyed physical activity, either alone or in competition with others. Washington loved outdoor sports. Schiller was a leader in athletics. Byron was an enthusiastic swimmer and rider. Lincoln was the champion wrestler and woodcutter of his neighborhood.

The widespread idea that great men often owe their success to their mother's influence upon their education does not receive verification from a study of these cases. The mother's place seemed very often to have been filled by some other person, frequently an aunt, either because the mother had died, or because there were many other children to care for. "The rôle of the aunt stands out prominently."

Finally, these great persons, like those included in the other studies made, were, in the decided majority of cases, derived from well-to-do families. Most of them were privately educated, by tutors or in private schools. Very few were "self-made." It is popular to believe, for instance, that Edison was in childhood a poor newsboy, who obtained his education without guidance. The truth, as set forth in the biography

which has his personal sanction, is that Edison's father was a well-to-do manufacturer, and that his mother was a trained and experienced teacher, who conducted his education privately at home. (This is one of the very few instances in which the mother really gave educational guidance.) Young Thomas sold newspapers because his allowance from the family would not buy him all the chemicals and other materials he wanted for his "play."

In connection with the contemporary study of gifted children, which we are about to consider in detail, the childhood of illustrious persons is especially interesting for purposes of comparison. It will be many decades before children now identified as extremely gifted can fully prove themselves out by the tests of life. We cannot know with certainty until a lifetime has elapsed whether they will really become the eminent of their generation. It is thus of special interest to compare their behavior and their traits with those of children who did become great.

From biographies not included by Yoder, it is possible to glean a few additional data. Elie Metchnikoff when eight years old used to pay his playmates to sit about and listen to him lecture on "the local flora."

Benjamin Franklin at the age of twelve invented extension paddles to fit over hands and feet, so that he could outswim all competitors. Marie Curie was "always the youngest and smallest child in the class." André Ampère when but three years old crumbled a biscuit, given him to break a fast, into pieces, so that he could count them. Carl Frederick Gauss, the great mathematician, at eleven years of age was fully ready to enter the gymnasium, where he soon outstripped his teachers in mathematics. From the unusually full description of childhood in Pearson's biography of Francis Galton, Terman has been able to adduce that Galton in childhood would have

shown an intelligence quotient of nearly 200 (as compared with par of 100), had he been given the mental tests now standardized and used. This is particularly interesting to us, because Galton in manhood did so much to lay the foundations for the study of genius.

As we proceed with this volume, we shall see how frequently, in the accounts of gifted children identified by mental tests within the past fifteen years, we are reminded of these descriptions.

VII. CHILD STUDY AND MENTAL TESTS

In the decades during which the studies of eminence just considered were being carried forward, what is known as the "child-study movement" developed in Germany, in Switzerland, in the United States, and in France especially. The naïve theory that the child is physically and psychologically an adult in miniature gave way to scientific (impersonal, systematic, calculated) study of how children actually behave and grow. Psychologists and educators began to observe children, under controlled conditions, and to make precise records of their observations. In this way educational psychology was formulated as a branch of professional learning.

Closely touching the child-study movement, and in certain features an integral part of it, developed the technique of mental tests. The investigations leading to modern mental tests began, it is true, with tests made on adults, in laboratories of psychology. They began with asking questions, such as, "How quickly can a human being react to a stimulus?" and proceeded with such questions as "How quickly and accurately can a human being choose among various stimuli?" With this last question began the rise of modern differential psychology and mental tests.

Now, certain students of child psychology and of mental

tests began to ask, "How do children react to stimuli, as compared with adults?" "How do children of one age compare with children of another age?" "How do children of the same age differ among themselves in ability to respond to various situations?"

With these questions, and with experimental attempts to get quantitative answers to them, began the modern approach to the study of genius and talent.

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CHAPTER II

The Modern Approach

I. FIRST APPLICATION OF MENTAL TESTS

The methods of studying the gifted in childhood are new, but the idea of doing so is not. Plato in *The Republic* speculated upon ways of identifying the intellectually gifted, in order to educate them for leaders in his Utopian state; and he concluded that some method must be devised for identifying the gifted while they are still children:

> We must watch them from their youth upwards, and make them perform actions in which they are most likely to forget or to be deceived, and he who remembers and is not deceived is to be selected, and he who fails in the trial is to be rejected. That will be the way.

These ideas were uttered about 400 B.C., but it was not until more than two thousand years later that they were first realized in practice. In 1904 the French psychologist, Alfred Binet, with his collaborator, Th. Simon, announced a series of mental tests by means of which they had been able to separate incompetent children from those of average ability. This achievement crowned long-sustained efforts of more than fifteen years, during which Binet had been a devoted student of child psychology and of mental tests.

Binet was the first actually to apply a workable series of tests for the practical purpose of classifying school children on the basis of intelligence. His success was founded, however, not only upon his own previous researches, but upon those of many other psychologists as well. For almost half a

century psychologists have been thinking, writing, and experimenting upon the nature of intelligence. They have been seeking to define intelligence, to analyze it into its elements, to discover how performances are related to each other, to find out how ability can be tested, and why people differ so widely in capacity to meet a test. These efforts, particularly those which are experimental, had yielded much information by the time Binet conducted the first practical tests.

The first service of the tests was, as has been stated, to identify children of inferior intellect. That was the specific task entrusted by the educational authorities of Paris to the commission of which Binet was a member, which led him to the concrete work of application in 1904. Feebleminded children differ from typical and superior children in degree of intelligence only, so that the same methods of measurement are applicable to all. At first, however, tests were employed almost exclusively to study troublesome and incompetent children. This was a logical result of the manner in which schools were organized at the beginning of the twentieth century.

The history of education reveals why mental tests were urgently needed by educators, at the beginning of this century, and why the first services rendered in this respect by psychologists had to do with the least able children, instead of with the most able. In past time education was privately conducted, and must be paid for directly by those who wished to have it. Under these circumstances only those children were educated whose parents had unusual foresight, love of learning, and ability to accumulate funds beyond the immediate essentials for keeping alive. This group of children was, therefore, small and stringently selected.

Before the opening of the twentieth century, several of the nations had arrived industrially and politically at a point where

government seemed to depend upon the education of all men, since all could vote, and where there was sufficient basis of taxation to support some form of free education for all children. Free schools were, therefore, established; and when a large number of children and of parents proved totally indifferent or even hostile to them, compulsory education laws were passed. Then the problem of truancy arose. Truant officers were appointed to bring children evading the law forcibly to school. The extent of attempted evasion of education at present may be judged from the fact that in 1923, in New York City, three hundred and eight truant officers were constantly employed in forcing thousands of children between six and sixteen years of age to attend school. A large majority of these truants are below average in mental ability. In past centuries children like these seldom came to school, and educators did not have to take account of them.

When children, regardless of inclination or ability, were compelled to go to school on the theory that all were born equal, educators found among them many who did not even approximate the rate of learning expected of all. These children gave such trouble and tried so often to escape, that there arose a pressing need of scientific information regarding their mental condition. Children who learned easily and loved learning, on the other hand, gave no trouble, so that no pressing need was felt to know more about them. Their excellence was taken for granted, attributed to diligence and "will power." It was what the teacher had a "right" to expect.

Thus for years after the first technical success of mental tests, psychologists used them only to study the children who occupy low places on the scale of intellect. It was supposed at first by educators that once the incompetent were identified and segregated, some form of educational treatment would "bring them up to normal." This hope has gradually dis-

appeared with the passing of two decades. Mental tests are, however, used more and more to classify children of all degrees of intelligence. Within the past five years, psychologists who have been chiefly interested in superior children have been able to obtain a hearing, and a considerable body of knowledge has been accumulated concerning those who test as far above the average intellect as the feebleminded test below. These gifted children are the subjects of our special study in this volume.

II. WHAT IS INTELLECT?

We have just spoken of "testing above the average intellect." What is meant by "intellect" or "intelligence"? Psychologists have made a great many attempts at definition, but none of them is, perhaps, entirely acceptable. By reviewing some of these attempts we shall, however, gain insight into the nature of this great force in human affairs which is called by common agreement "intellect" or "intelligence."

When the problem of measuring intelligence was first taken into the laboratory, it became necessary to abandon mere dictionary and metaphysical definitions in favor of definitions which would afford a workable approach to direct observation of the force in action. Soon it was apparent that *a mind must be judged by its product*. The measurement of *performance* offers the only approach there is, or probably ever will be, to the measurement of mind. The attempt to define intelligence then became the attempt to examine the elements of adequate performance, under stated conditions.

Binet deduced from his experimental work that adequate performers show three chief characteristics: (1) ability to take and maintain a given direction, (2) ability to adapt behavior to attain a desired outcome, and (3) capacity for auto-criticism. Witmer proposed the power to deal with novelty as

the chief feature of intelligence. Ebbinghaus concluded that intelligence is relational thinking, and Spearman has expressed his agreement with this view in the following words:

> The mentally presenting of any two or more characters (simple or complex) tends to evoke immediately a knowing of relation between them. . . . The presenting of any character together with any relation tends to evoke immediately a knowing of the correlative character.

Capacity for the right completion of complex forms, both material and immaterial, from fragments, has been considered by one school of thought to be the distinctive feature of intelligence. Still other psychologists have been content to say simply that intelligence is capacity for learning; since learning in its broadest meaning includes assimilation of both "propositions" and "originals" - includes taking a proper "set" toward any situation, responding selectively to its many elements, and finally assimilating it in relation to what is already known. These aspects of learning apply equally to lessons and to discoveries. Psychologically, the presence or absence of a teacher does not alter the laws of learning. They are always fundamentally the same for all learners. Thus to say that intelligence is capacity to learn covers, in brief, most of what is contained in the other definitions, provided we carefully understand that Fulton learned how to move a steamboat and a child learns to escape from an inclosure that surrounds it, according to the same laws.

In all these attempts at definition we find that the idea of "adequate" or "right" is expressed or implied. Intelligence is the force which produces *adequate* performance, *right* solution, *correct* learning. Adequate, right, and correct in what sense, then? Thorndike has formulated an answer to this question, saying that by "adequate," "right," or "correct" is meant *true*, in the sense of *valuable for prediction*:

Intellect is concerned with facts, being the ability to see and learn the truth, to get true knowledge and use it to the best advantage. Truth is insight into the real world, the evidence that knowledge is true is its predictive power. Measures of intelligence are then ultimately measures of a man's mastery of prediction.

From all these reflections there emerges a concept of intelligence as the power of learning how to accomplish or how to obtain what the organism desires. This power is present in some degree in all animals, from the unicellular amœba and paramecium to the most gifted of human beings. Animal intelligence is of innumerable degrees, distributed through the various species in varying typical amounts. Our interest is here restricted to the highest degrees of human intelligence. Yet it is necessary to understand clearly that modern psychology recognizes the continuity of this force throughout the animal world. The power which enabled a man of genius to discover the carrier of yellow fever enables, also, the earthworm to learn avoidance of the dry sandpaper spread along his route in devious ways by the watching experimentalist.

Intelligence learns how to do and how to get what is wanted. An organism which learns slowly how to do simple processes, and how to get easily obtainable things, has little intelligence. One who quickly learns how to perform extremely complex and subtle feats and how to reach and grasp that which is very evasive, has much intelligence.

In closing our consideration of definitions we ought, perhaps, to note that there have been attempts to distinguish in meaning between the terms *intellect* and *intelligence*. These attempts have not met with success. For our purpose the two terms will be used interchangeably, with the same meaning.

III. WHAT IS TALENT?

One further consideration as to the nature of intelligence must now detain us. This concerns the question of *relation-*

ship among all the various performances of which an organism is capable. We have stated that the measurement of performance is the only means we have of measuring intellect. But man is capable of countless different performances. The unicellular amœba is capable of but two performances when stimulated—it can expand or it can contract. Man, at the other extreme, can perform in countless ways, responding to countless situations.

In causing a person to perform under laboratory conditions, psychologists early observed that a given individual did not do equally well in every kind of situation. He might deal much more adequately with numbers than with bolts and hinges, for example. He might rate above the average of a group in pitch discrimination, but below the average of the same group in ability to say the opposites of words.

These observations led to many years of study on the relationships among performances. It is evident that if there were no positive relationship among an individual's performances as regards their adequacy, then we could not speak of his intelligence but would have to speak of his intelligences. Some of the psychologists investigating this matter at first took the view that such must be the case. Others insisted that a positive relationship among all performances would ultimately be demonstrated, which would warrant use of the term *general intelligence.* Scores of researches have now been conducted, and we know that there is not a perfect correlation among performances as regards their adequacy in given individuals. A person may consistently "do better" in some kinds of situations than in others. Nevertheless, there is positive correlation, however imperfect, among performances. If a person scores above average in one situation, he usually falls somewhere above average in meeting most other situations also. If he deviates from average in one performance,

he will probably deviate from average *in the same direction*, whatever he undertakes; but he will probably not deviate *equally far* from average in all he does.

This fact, that on the whole abilities cohere in an individual as regards amount, enables us to measure *general intelligence* or intellect. There are, however, certain abilities which show little or no correlation with others. It will be long before we know very much about these specialized aptitudes, but even at present we have identified some of them. Musical ability and ability in representative drawing are two important examples of aptitudes which do not correlate closely with general intelligence. In order to distinguish these special aptitudes from intellect in our discussion, we shall call them *talents*. In studying gifted children we shall wish to notice those who are superior in these special talents as well as those who are of extraordinary intellectual power.

IV. WHAT IS GENIUS?

In discussing gifted children we shall avoid the term *genius*, because it has no exact psychological meaning. It is one of those words which have been bandied about for a long time, signifying different things to different people, until their integrity has been destroyed. Such a word is useless for scientific discussion, because everyone supposes he knows its meaning while it says something different to each one. Galton, having placed this word in the title of his book, *Hereditary Genius*, later regretted its use, because of the misunderstandings to which it led. In a second edition of his work, Galton explained that he meant by "genius," natural ability, and then proceeded to define it thus:

> By natural ability I mean those qualities of intellect and disposition, which urge and qualify a man to perform acts that lead to reputation. I do not mean capacity without zeal, nor zeal without capacity, nor even a combination of both of them, without an adequate power of doing a

great deal of laborious work. But I mean a nature which, when left to itself, will, urged by an inherent stimulus, climb the path that leads to eminence, and has strength to reach the summit — one which, if hindered or thwarted, will fret and strive until the hindrance is overcome, and it is again free to follow its labour-loving instinct.

Genius as thus conceived includes intellectual, moral, and physical superiority, all in great degree. To others who have written about genius, the term certainly does not imply moral courage, for they speak of genius as correlated with moral depravity and insanity. Still others would not be willing to include physical strength as an essential element of genius, for they refer to genius hampered and abortive for lack of physical energy. It seems, also, that the word "genius" is by some limited to mean prodigious performance in the line of a special talent, as in music.

In addition to all these conflicts of signification, there is the superstitious conception of genius, referred to in Chapter I, as something semidivine, mysteriously superhuman. Striving, as we are, for clear understanding of the facts about gifted children, it seems best not to describe them as geniuses. We cannot use a word which has lost its precision, as this word has done, though probably to everyone the real core of its meaning is "capable of wonderful performance."

V. WHAT IS A MENTAL TEST?

Gifted children are those identified by mental tests as very superior to the average. At this point a need may be felt for some description of a mental test. The description formulated by Plato is in many respects very good. A mental test is 'an action in which one is most likely to forget or to be deceived.' In the modern terminology of the laboratory, a mental test is a standard stimulus, which evokes a response susceptible to quantitative interpretation. Almost any performance of which the members of a species are capable can

be standardized into a test. The technique of standardization is complicated and would demand a volume for thorough discussion. Briefly, standardization enables us to know how much the typical (or average) members of a species, an age group, an occupational group, or the like, can do in a given situation, and to find the capacity of any member of the species, group, or class, relative to the typical members.

Some situations are much better than others as tests of general intelligence. We have stated that between most performances there is some amount of positive correlation; so that it is possible to predict to some extent what a person can do in one situation from knowing what he did in another. However, the amounts of these correlations vary considerably. Some performances are, therefore, measurably more valuable than others as symptoms of mental caliber. On the whole, problem situations which can be elaborated from extreme simplicity to extreme complexity, which combine novel elements with familiar ones for solution, and which call for the slightest participation of parts of the body other than the cerebrum, are the best tests of general intelligence. The first of these conditions is a corollary of the great range of human ability which has been disclosed by testing. To give every adult member of the human species full opportunity to achieve his true rating relative to the average in a test, it must range in difficulty from what an idiot can do to better than can be done by the most subtle and retentive thinker. It is not at all easy to devise such tests. Mental measurement is, and for a long time will be, in a state of being perfected. Nevertheless, even by methods now available it is possible to identify the intellectually gifted as early as the sixth year of life. We can find, by test, those who grade in the best one or two per cent of their generation.

With regard to testing for special talents, psychological

technique has not advanced so far. Children cannot be classified at six years of age for ability in music or in drawing. At and after a "mental age" of about ten years, children can now be classified in certain phases of musical sensitivity. There are also some other talents in regard to which quantitative statements are now possible. Of these matters we shall speak in a later chapter. The method of standardization in tests of special talent is the same as that in tests of general intelligence — find the amount of performance characteristic of the average members of the species, and then calculate the performance of deviating members in terms of that typical amount.

In the most reliable tests of general intelligence at present available, this "typical amount" is designated as 100, which may be thought of as "par" for the species. Any amount less than 100 is "below par," and any amount greater than 100 is "above par." An intelligence quotient (IQ) of 50 is, for example, far below par, while an intelligence quotient of 150 is very superior. This practice of classifying in terms of "par" has the great advantage of being fairly easy to comprehend on the part of those who need to know something of the facts of mental status, but who have not time to master the subject of mental measurement. In some respects it is, however, crude, and the future will probably witness the development of mental measures in terms of the percentage of persons achieving successive places on the scale of merit, or in terms of a unit which has not yet been evolved.

We ought now to return for a moment to our statement that intelligence has never been defined in a universally acceptable manner. This sometimes puzzles those who are striving to understand the new knowledge gleaned from tests, because they cannot see how that can be measured which cannot be defined. This, however, need trouble no one. Text-

books of physics do not define electricity, but this does not mean that there are and can be no meters.

Others, again, are puzzled to hear that intelligence is measured, yet to hear at the same time that mind can be approached only indirectly, through observation of its product. This, too, finds its analogues in the world of physical science. Time cannot be approached directly; it can be measured and known only by the movement of some object through space. Heat cannot be measured directly; it can be known exactly only by the expansion or contraction of a chemical substance in a tube. Yet we are not prevented by these conditions from acting effectively according to the results thus indirectly obtained, concerning time and heat. In like manner we can act in practical affairs upon the measurements of intelligence gained indirectly from performance in a test.

VI. THE DISTRIBUTION OF ABILITY

The development of mental measurement to the point of practical application has enabled psychologists to put to the test Galton's theory (based on the frequency of eminence) that mental ability is distributed among us, as "hands" are distributed among millions of players in games of chance. Referring back to Figure 1, we recall that Galton suspected intellect to be distributed among the people of the world in such a way that most receive a mediocre endowment, only a few being extremely unfortunate or extremely fortunate in amount of ability bestowed by nature. He suspected that so few persons become illustrious for the reason that only a few extremely fortunate combinations can occur in the great, blind, biological shuffle of human reproduction.

It is wonderful to see how nearly Galton's hypothesis has been verified by test, in the years since 1869. Again and again psychologists have applied their tests to huge samplings of unselected human beings; and always they find that perform-

ance in tests is distributed among those tested, in a form approximating Figure 1. The great majority of scores pile up at a central point upon the scale of merit, and gradually decrease in number as they go toward "more" and toward "less." The point where the scores pile up most thickly has come to be called "the central tendency" or "the mode." The central tendency represents mediocrity, or par ability. No matter how often the group is tested, if it is large and unselected, it repeatedly approximates this same form.

Let us now turn from Figure 1, which is a schematic representation of Galton's theory, and consider a few actual curves, resulting from tests given. In 1912, Goddard tested 2000 school children of New Jersey by means of Binet's scale of tests. He found ability distributed among them so that most of them fell at or near "par," a minority being about equally divided between fortunate and unfortunate deviates.

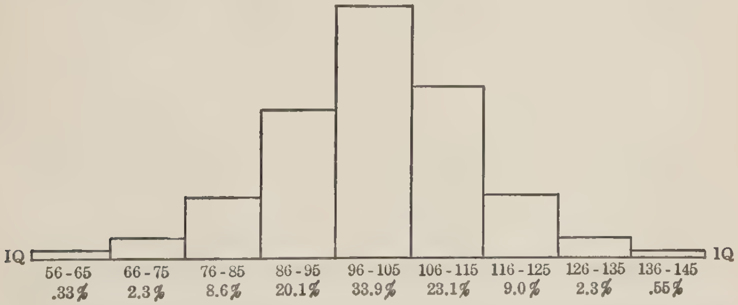

FIG. 2. — Showing how intelligence is distributed among 905 school children, classified in terms of intelligence quotient. (From Terman's *The Measurement of Intelligence*. Reproduced by permission of and special arrangement with Houghton Mifflin Company, the authorized publishers.)

In 1916, Terman, who had greatly improved upon Binet's scale, presented the results from the testing, in western United States, of 905 school children as nearly unselected as school children can be. He obtained the distribution of ability shown in Figure 2.

It is seen that very few children in 900 reach as far above par as 140 IQ. Only about one child in 240, in our city populations, tests at or above 140 IQ. This gives a proportion of less than one-half of one per cent who show these high degrees of intellectual endowment. Degrees of intelligence as high as 170 IQ, 180 IQ, and 190 IQ are so rare that they are unlikely to appear at all in a "sample" as small as 900. To include one or two children so very gifted it is necessary to increase the sampling beyond the numbers tested by Terman, for not one in a thousand is so gifted.

Scores of distributions could be reproduced here, to show how the same phenomena recur wherever children (or adults) chosen at random, are submitted to mental tests. That the curve has a characteristic shape is no longer a matter of theory or opinion. Anyone who will take the necessary preliminary training can verify the facts for himself. They are as capable of verification as is the fact that water is composed of H_2O, or that a projectile comes to rest by the route of a descending curve.

Do we know, then, that intelligence is distributed among human beings exactly according to the laws of chance — that biological nature is like a perfectly impartial dealer, who shuffles cards of many different values, and distributes them in chance combinations?

There is a mathematical exactness governing distributions by pure chance which has not as yet been demonstrated for distributions of intelligence. Mathematical proof or disproof is rendered practically impossible by the extreme difficulty of finding absolutely unselected samplings of the human species. To obtain what is necessary for absolute mathematical proof — *a large perfectly random sample of all persons of a given age who have been conceived* — is impossible in any case because of the strongly selective nature of the death rate,

which operates even before birth. To approximate mathematical proof by making allowance for this factor is rendered practically impossible, also, by social selection, which is connected with intelligence and which works and has always been working in subtle and unnoted ways to segregate persons of different degrees of ability from each other.

These difficulties will be more fully appreciated after an hour of concentrated thought on the problem of how to obtain a thousand perfectly unselected six-year-olds for mental testing. At first the solution seems easy: Go to a public school, and there test every six-year-old child in it. This will not do, however, for many reasons. In the first place, there are six-year-olds who do not come to school. The most ill-favored children cannot yet speak intelligibly at that age, have not learned the most elementary habits of personal cleanliness, or cannot, perhaps, even walk. They cannot come to school. So we shall always miss the very lowest "combinations" in nature's dealings by taking school children. Again, we must consider the location of the school in which we might seek our sample of six-year-olds. Is it a public school in a city slum? Then we shall obtain too many children whose parents are satisfied with the slums or unable to rise above them. These six-year-olds will be what is called "an unfavorable selection" of all surviving. Is it a public school in a very good residential section of the city? We must beware, for we shall undoubtedly obtain here "a favorable selection" of children. In a city it is almost impossible to find pupils impartially distributed for ability, to say nothing of an impartial selection of all children born. Good and poor residential sections are sharply defined, and social selection proceeds inexorably on the basis of shelter.

But how about country schools? Can we not find at least a group of *surviving pupils* here, among whom ability is im-

partially distributed? No; for there is every reason to suppose that those parents or potential parents who leave the country for the city are far from "chance" cases. There is probably a constant draining away of the most intellectual persons toward centers of population. As for private schools, they offer us a very stringently selected group of children, nearly all testing above the average of children found in public schools, even in public schools located where private schools do not exist. In localities where private schools flourish, they further disturb the balance of the curve for public schools by draining off children from the top of the distribution.

To these and other phenomena of social selection we shall refer again. We mention them here only to show how impossible it is to secure from human populations the necessary impartial sample, which would supply perfect material for mathematical proof or disproof of the proposition that the intelligence of a people is distributed by pure chance. We have cited six-year-olds because persons younger or older offer still more complications of selection.

We can only say, therefore, that from the approximately impartial samples of human beings which it is possible to obtain, we find always an approximation to chance distribution, so close that for educational purposes we may proceed on that hypothesis. The larger and less selected the group tested, the closer is the approximation to the curve of chance, shown in Figure 1.

A word of warning must be said here for those whose knowledge of statistical procedures is limited, as must necessarily be the case with many students of education. By "chance distribution of intelligence" we do not mean that nothing whatever can be predicted about the intelligence of a designated unborn child. From full knowledge of ancestry, fairly reliable predictions of the particular chances of such a child

may be made. An individual of above-average ancestry has by no means the same range of chances as has an individual of below-average ancestry. It is only when we consider the species as a whole, or a large sample of it, that the combination of results from all past matings gives endowment distributed according to the workings of chance — that is, chances of great range and variety have been taken as regards combinations of ancestry. This point will be discussed more fully in the consideration of heredity.

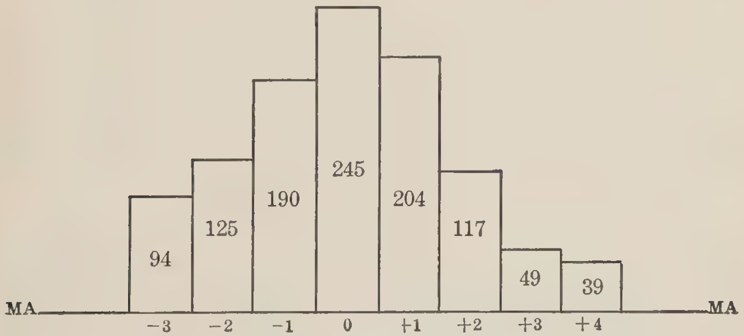

FIG. 3. — Showing how intelligence is distributed among 1063 eleven-year-old school children of the county of Northumberland, in England. (From Thomson's "The Northumberland Mental Tests." Reproduced by courtesy of *The British Journal of Psychology*.) Compare with Figures 1 and 2. Note similarity of form.

We have said that we might cite scores of distributions to show how the same phenomena recur, but we shall content ourselves with one more illustration, Figure 3, chosen from the county of Northumberland, in England. Thomson tested the pupils in that county and presented the result in 1921. We see how these children, in a foreign land, show the same form of distribution seen among our own pupils. The form is not a function of a particular environment, then. It manifests itself among peoples widely separated in space and surroundings, as a biological law always does.

Furthermore, the same distribution of ability to perform is seen among the lower animals. If a large herd of animals begins to run, after a "test" of a mile's length a few will have gone the whole mile, the majority will be in a central position in the race, and a few stragglers will be left in the rear. Flocks of birds undergoing the test of flight may be seen against the sky, as represented schematically in Figure 4.

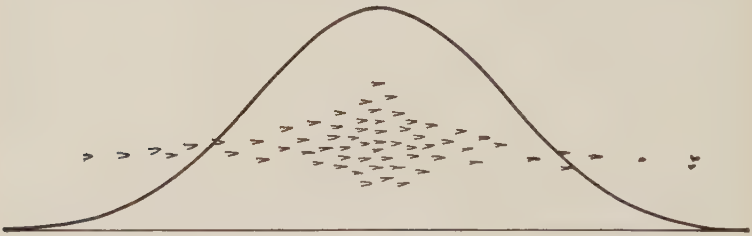

FIG. 4. — Suggesting distribution of ability to fly (schematic).

These illustrations from the abilities of lower animals, visible to all who watch for them, help us to comprehend the phenomena of mental performance which are invisible. They also suggest how the laws of distribution hold throughout organic nature for physical and mental magnitudes. We could illustrate them from plants as well as from animals, but to do so would take us too far afield from our particular subject. The examples given will suffice to show that whenever a great many unselected individuals of a species undergo a test, superior performers always emerge, and that these superior ones are few.

The new knowledge thus accumulated, and the new tests invented in the twentieth century, afford us the modern approach to the study of the gifted. We can now study gifted children and learn eventually all we care to know about extraordinarily able persons, their education, and their place in civilization.

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CHAPTER III

The Census of the Gifted

I. WHAT IS A GIFTED CHILD?

We mean by gifted children those who test much above average on standardized scales for the measurement of intelligence, and also those who test much above average on scales for the measurement of the special talents. Since comparatively little is known as yet about the latter, our discussion will relate chiefly to those gifted intellectually.

Realizing, as has been set forth in the chapter preceding, that "above average" covers a very wide range of successive and continuous degrees of ability, it will be necessary to define further the degree of intellect which interests us. This is best done by determining arbitrarily upon a *certain proportion* of the population, or, in the language of the laboratory, upon a given section of the percentile range. Thus we might discuss the highest ten per cent of children, or the highest twenty-five per cent, as gifted, and so forth. The quantitative study of the subject is so new that no universal usage in the matter has been established, as to *how much* intelligence shall permit the individual to be designated "gifted."

Terman in 1916 suggested the following classification of children, on the basis of IQ:

	IQ
Genius or near genius . .	above 140
Very superior	120–140
Superior	110–120
Average	90–110
Dull normal	80–90
Dull	70–80
Feebleminded	below 70

This classification has frequently been followed in the literature and in the practice of school psychologists. One often finds children testing anywhere above 110 IQ called "gifted," as synonymous with superior. This range — from 110 upward — includes a fairly large proportion of all children born. It includes possessors of all the degrees of giftedness from those just capable of passing with good credit through an ordinary high school to those capable of the most distinguished intellectual careers of their generation. About twenty per cent of all children test at or above 110 IQ, and may be termed superior.

In our present discussion we shall in general limit our interest to those who are so gifted that not more than one child in a hundred falls within their range. Thus we draw our line, and arbitrarily choose to mean by "intellectually gifted" *the most intelligent one per cent* of the juvenile population. What is true of these will be understood to be true in decreasing degree of all children as they go down the scale.

The percentage distribution of the children tested by Terman (see Figure 2) was as follows:

The lowest 1% go to 70 or below;	the highest 1% go to 130 or above
The lowest 2% go to 73 or below;	the highest 2% go to 128 or above
The lowest 3% go to 76 or below;	the highest 3% go to 125 or above
The lowest 5% go to 78 or below;	the highest 5% go to 122 or above
The lowest 10% go to 85 or below;	the highest 10% go to 116 or above
The lowest 15% go to 88 or below;	the highest 15% go to 113 or above
The lowest 20% go to 91 or below;	the highest 20% go to 110 or above
The lowest 25% go to 92 or below;	the highest 25% go to 108 or above
The lowest 33% go to 95 or below;	the highest 33% go to 106 or above

The best one per cent of children test approximately at or above 130 IQ. That 130 IQ is exactly the point of delimitation of the best percentile cannot be positively stated, for if a sample ten times as large as 905 were tested, or if all children instead of school children were tested, or if the tests were twice

as refined as they are, the point of delimitation of the best percentile might be shifted up to 135 IQ or down to 125 IQ. It would not, however, be shifted far by such procedures; so that we may be content to say that the most intellectual one per cent grade at or above 130, in terms of IQ. That is to say, the tested "mental age" of these "best" children exceeds that of the average child by thirty per cent or more. These children we choose arbitrarily to discuss as *gifted*.

The most gifted children reported up to this time in the literature of child psychology test at near 100 IQ. These are of such rare occurrence that there is not more than one in many thousands, the country over. There is thus still a very wide range of intelligence among those whom we have chosen to call gifted. There is a difference of at least 00, in terms of IQ, between the least gifted child in the best one per cent and the most gifted. The *average college student* succeeding in a first rate college in this country probably has an IQ near 130. From that amount of ability, the best one per cent range upward into all the much greater possibilities of intellectual accomplishment.

II. TAKING A CENSUS

Knowing as we do that in nearly every large school system a proportion of the children will be gifted, how can we detect or identify them? We know, of course, that the most precise method of taking a census of the gifted would be to give every surviving child individual mental tests and to evaluate the result in the light of all ascertainable facts about health, education, and heredity. Practically this procedure is out of the question.

Therefore, educational administrators and psychologists have evolved various means of making preliminary selections of the probably gifted, to whom tests are subsequently given.

The means used for these preliminary selections have been chiefly teachers' judgments, school marks, and group tests. The values and limitations of each of these means call for comment.

Census of gifted children, more or less complete, has been taken up to this time among public school children in Oakland and Berkeley, in other California cities, in certain districts of New York City, in Cleveland, in Detroit, in several German cities, in London, in Northumberland, and doubtless in many other places. Also, several private schools have lately published surveys of their pupils, showing the proportion of gifted. These records furnish us with many interesting facts, some of which have been hitherto unsuspected.

III. TEACHERS' JUDGMENTS

To those who have given no close thought to the matter, it might seem that teachers would be able to select highly intelligent pupils as well as, or better than mental tests do. Experiment has repeatedly demonstrated, however, that such is not the case. The most accurate judges of children are no doubt experienced teachers in public schools. They are better judges than parents are, and probably they would prove better than any other single group of judges that could be found, if we had to rely upon fallible subjective criteria alone. This excellence in judging arises from the fact that the teacher knows a great variety of children, the incompetent as well as the competent, which gives a somewhat reliable means of comparison. Scarcely anybody sees as many and as various children as an experienced public school teacher has seen. Parents know well only their own children, and those of their friends and relatives. These usually afford a very restricted range of competency, because of heredity and social selection. A parent of a gifted child, asked to rate the child, will often

give a rating of "average." Asked why he or she considers the child to be average, the response will usually be, "Because he is just about like the rest of the family." Such replies reveal the essential lack of a scientific standard of comparison among parents.

As for other professional groups dealing with children — nurses, physicians, social workers, teachers in private schools — each has to do with children highly selected on some peculiar basis. Nurses and physicians most often see sick children. Social workers see dependent and delinquent children. Teachers in private schools see the children of parents who can afford to pay tuition fees. But public school teachers see children as nearly unselected as they can be. Although they are, therefore, probably the best judges we have, their opinions are nevertheless subject to all the causes of error that beset human judgment generally and are very fallacious as compared with scientific tests.

Experiment has shown that teachers differ greatly from each other in the accuracy with which they can estimate the intelligence of children. The judgment of some teachers is almost perfectly hit-or-miss, while at the other extreme are a few who can select as many as sixty per cent of the most intelligent children in their classes. Ordinarily the teacher can select not over half of the very intelligent children under her tutelage, when asked to select all of them. There will be likely to be included on the list some who are of average intelligence, and even some who are decidedly stupid. For instance, an excellent teacher, with five years of experience in the elementary school, was recently asked to list the five most intelligent of the forty pupils in her class who had been with her for three months. Two of the five designated were among the most intelligent by test; two were of average intelligence, and one was very dull. How do these mistakes

occur? How do we know that the teacher, and not the test, is in error?

The single most fruitful source of error in teachers' judgments is failure to bear in mind the factor of *age*. The teacher judges as "most intelligent" those doing work of good quality in the grade where she is teaching. Thus she is liable to include dull children, very much over-age, who are doing good work in a low grade with younger children. For instance, the dull child judged to be bright by the teacher just mentioned was fourteen years of age, doing good work in the fifth grade especially in penmanship and sewing.

Another reason why teachers err in judgment is that they do not have in mind a clear idea of the meaning of intelligence. We have seen how difficult it is, even for those who have devoted years of special study to this subject, to arrive at a perfectly clear concept of intelligence. It is common to assume that everyone "of course" knows what intelligence is, and to proceed to form judgments naïvely. This results in deviation from the findings of scientific test. Analysis shows that irrelevant factors become involved in the judgments rendered, especially traits of character, personal appearance, special talents, and the like. A handsome, well-behaved, appropriately dressed child has more likelihood of being judged bright than has a child of equal intelligence who is ugly, rude, and dirty. One teacher recommended a child as "extremely intelligent, because he can play the ukelele and sing." Also, obedience, conformity, or loquacity may be confused with intellect in a teacher's mind.

These and other kinds of errors enter into all human judgments whatsoever, so that opinions are never very reliable except when a considerable number of them, rendered independently, are combined into an impersonal judgment. These are commonplaces of the psychological laboratory, which

have, however, not penetrated far as yet into general practice. Most people do not hesitate to rely upon personal judgments.

Varner has recently shown that it is more difficult for teachers to select bright children than to select the dull. Evidently the symptoms of stupidity are more reliably known to teachers than are the symptoms of superior intellect. "Teachers can select 20 to 40 per cent of the bright pupils in their grade, and from 50 to 60 per cent of the dull." This proportion was found among teachers to whom a definition of intelligence had been given. Varner concludes that, "In selection of pupils to enter classes for gifted children, teachers' estimates are of practically no value." This conclusion is probably not quite warranted. In most instances where teachers are asked to designate the most intelligent pupils, their judgment has been found to have some value — that is, more of the truly gifted are found thus than would be found by blindly guessing.

No doubt it will be possible for teachers to become more proficient than they are now in evaluating gifted children. They may avoid many of the errors to which they are subject by becoming fully conscious of the sources of error. One who realizes that "old" children in the lower grades are almost invariably stupid will think twice before judging as gifted a fourteen-year-old doing good work in the fifth grade. One who bears in mind the speculations about intelligence which have been outlined in the preceding chapter, will be less likely to confuse "bright eyes," or "ability, to sing and to play the ukelele" with intellectual acumen.

Nevertheless, refine it as we may, personal judgment rendered without an objective standard cannot approach scientific methods in accuracy. One might give minute instruction to himself or others concerning the properties of weight or heat. Yet one would probably remain unwilling to purchase pounds

of goods at the grocer's without the aid of scales, or to abolish the clinical thermometer in his illness.

IV. SCHOOL MARKS

School marks arise, in general, from teachers' judgments and are subject to many of the fallacies just discussed. Experiment has shown how widely teachers will diverge in grading a given exercise or examination paper. Marks ranging from ten to ninety per cent, on a scale of one hundred, have been obtained from teachers' independent ratings of a student's paper.

Generally, gifted children receive superior school marks, especially in the more abstract phases of arithmetic, reading, and grammar. Very reliable preliminary selections of the gifted may, in fact, be made by taking children who have received high marks from at least *three different teachers* and who are young for the grades in which the marks have been given.

Where school marks depend to some extent on standardized tests of knowledge (often called educational tests), the reliability of the preliminary census by means of them will be decidedly increased. The school standing of gifted children will be fully considered in a subsequent chapter. Here it is sufficient to note that under certain conditions, which have been suggested, excellent school marks are strongly symptomatic of very superior intellect.

V. GROUP TESTS

During the World War when it was decided to apply intelligence tests to recruits, it was impossible to give each man an individual examination. In this emergency psychologists devised pencil-and-paper tests, which could be given to as many as fifty persons at a time by one examiner. These tests functioned as a coarse sieve, to select in a preliminary way those who stood at the two extremes of intelligence.

After the war, the principles of group testing were applied to public school children. Group tests as at present available afford crude measures of mental ability and can be used to make relatively unrefined classifications of capacity. Thus they can be used to take a preliminary census of gifted children. Those who fall into the best five per cent on a good group test will include nearly all of the children who by thorough test belong in the best one per cent. A good combination of teachers' judgments, school marks, and the results of group tests will select a very large percentage of all the gifted children in a school system. Even this combination of means will, however, fail to detect a few who would be identified as gifted by thorough individual test. Nothing takes the place of a well-standardized mental test, given to the child alone by an experienced examiner, as a means of identifying a truly gifted child.

How do we know that the scientifically constructed test, thus administered, is better than a teacher's judgment or than school marks? We know because the research of the past twenty years has proved that the test is the best *instrument of prediction*. Children, given appropriate opportunity, usually achieve and develop in accordance with the predictions of mental tests instead of in accordance with predictions from other sources, when there is a conflict of prediction. Of these matters we shall have more to say subsequently.

VI. AGE AND THE RELIABILITY OF THE CENSUS

Varner, in the research already mentioned, found that in the primary grades, where the children are five, six, and seven years old, teachers' judgments are very erratic, but that in the upper grades they show a greater percentage of accuracy. This is probably due not to greater acuteness of teachers in the grammar grades, but rather to the fact that there is less

understanding of what the symptoms of intelligence are at the earlier ages. An older child has had more scope at school, more opportunity to make an impression of intellectual power, in recognized ways.

With the studies at present being undertaken of the pre-school child and of the young child at school, we shall soon be in position to tell more fully how the gifted child shows his endowment during the first seven years of life. Mental tests at present standardized do not give very reliable results under six years of age. This is because of the difficulties encountered in collecting children under school age, who can be regarded as a random sample. House-to-house canvassing for little children does not yield the right standard, because some parents will not permit their offspring to be tested. These parents cannot be assumed to be entirely unselected as regards intelligence. Day nurseries usually cater to highly selected sections of the maternal population, so that the children in them are unsatisfactory for our purpose.

These difficulties of selection stand in the way of obtaining exact knowledge concerning the abilities of pre-school children, and explain why a reliable census of the gifted cannot yet be taken under six years of age. There is no peculiar unfathomability of the years preceding the sixth birthday. It is only that psychologists have not as yet had opportunity to make adequate studies of children not at school. Within the next fifty years it will probably become feasible to identify gifted children long before the sixth birthday.

VII. SYMPTOMS OF UNUSUAL ABILITY

Although much remains to be learned about the authentic symptoms of extraordinary intellect in young children, apart from scientific tests, we already know something of them. Persons who have no organized knowledge about children

nevertheless often use typical phraseology in speaking of those whom tests select as gifted. When we hear repeatedly from various people that a given child is "very old-fashioned," "quick to see a joke," "old for his age," "a regular bookworm," or that he has "an old head on young shoulders" or "such a long memory," we usually find him to be highly intelligent by test. Those using the phrases may have no idea of their significance, may not realize at all that the child whom they call "old for his age" stands, and will continue throughout life to stand, among the extremely intelligent of his generation. (The mental test only reveals how old for his age he is, and predicts from the amount of excess mental age his status in adulthood.)

Also, early interest in number and in the exact meanings of words is strongly symptomatic. Dictionaries and encyclopedias are a source of pleasure to the gifted. Ability to read understandingly at an unusually early age is characteristic, and a given point in school is usually reached exceptionally early. Being youngest in the class usually is a sign of superior intelligence.

To keep account of the passing of time is also a reliable symptom. The young child under ten years of age, who has a constant interest in clock and calendar, and in the divisions and subdivisions of time, is likely to "test high." Other symptoms less reliable than those described, but nevertheless of some value, pertain to general efficiency in the management of everyday affairs, reliability, punctuality, and so forth. These traits of character deserve and will have fuller treatment in the course of our discussion.

VIII. FREQUENCY AS RELATED TO PARENTAL OCCUPATION

Among people in general who believe at all that innately gifted children exist, there seems to be prevalent a supposition

that they are usually born in rural districts or of manual toilers in cities. We noted in a previous chapter that eminent adults are usually of urban birth and that they originate in an overwhelming majority of cases from well-educated, well-to-do parents. Let us see what recent surveys have revealed concerning the environmental condition of young children who by test are gifted.

Census of the intellectually superior has been limited almost entirely to cities, up to the present time, because of the greater convenience of examining populations congested within a narrow area. In urban populations the great majority of children who test above 130 IQ originate in families of superior social-economic status. Their fathers are usually professional men, proprietors, or clerical workers.

In California, Terman found that the fathers of fifty-nine gifted children discovered by him ranked according to the occupational classification of Taussig as follows:

Class 1.	Professional men and proprietors	53%
Class 2.	Clerical workers	37%
Class 3.	Skilled tradesmen	10%
Class 4.	Semi-skilled tradesmen	0%
Class 5.	Unskilled laborers	0%

The results indicate that parents of a grade of intelligence low enough to keep them in the unskilled or semi-skilled class are not likely to produce children of the grade of ability represented in this study. Of the seventeen subjects testing above 150 IQ, sixty-five per cent belong to class 1, thirty-five per cent to class 2, and none to class 3. Several children of the two lower social groups were brought to our attention, and were tested, but in no case was the IQ above 130. There is a tendency on the part of teachers to overestimate the intelligence of such children. The laborer's child of 130 IQ attracts about as much notice as a college professor's child testing at 150.

More recent and much wider investigation carried out by Terman has served only to confirm these findings. In a sample of a thousand gifted children there have occurred a few whose fathers are semi-skilled or unskilled manual laborers; so that

the contribution of families at these economic levels is not absolutely nil. However, it is extremely meager; and the professional classes, who include not over two per cent of the total population, furnish over fifty per cent of the children testing in the highest one per cent.

In New York City the findings are similar. Fifty children, testing over 135 IQ, selected from the public school population entirely without reference to parental status, were subsequently found to have fathers rating above Taussig's class 4 in ninety-six per cent of cases. Two fathers only had failed to achieve this rating, one being a semi-skilled worker in the clothing trades, the other being a casual laborer.

We may cite another of the various studies of this matter which have been made in the United States — one made at a point midway between the seaboards. In Madison, Wisconsin, 2782 school children were rated as to intelligence by group tests and the occupational status of their fathers was then ascertained. The mean IQ of the offspring in each of the several groupings of fathers is indicated in the following tabulation:

Occupation of Father	Mean IQ of Children
Professional men	115
Clerical workers	106
Business men	104
Skilled laborers	99
Semi-skilled laborers	92
Unskilled laborers	89

Skilled labor is thus almost exactly at par as regards offspring. The great majority of the intellectually gifted will be found among the groups whose offspring yield the highest means, that is, among professional men and clerical workers. Unskilled labor yields offspring distinctly below par, on the

average, so that only here and there can we expect to find at this occupational level offspring of intellectual promise. When we do find a very gifted child under such conditions, the occurrence impresses us unduly and is long remembered because of its very infrequency.

It is well worthy of note that in England, where we are accustomed to consider that social economic status is much more firmly decreed by class distinction than in our own country, the correspondence between intelligence of children and occupations of their fathers is about the same as in the United States. Duff and Thomson have found for the county of Northumberland almost exactly the same distribution of juvenile intelligence among occupational groups as that just cited from Wisconsin.

Recently Haggerty and Nash have studied eight thousand school children in New York State in rural schools — that is, in schools of communities not exceeding 4500 in population. Their results are confirmatory of those already cited. Figure 5 shows the spread of the middle fifty per cent of offspring in the various occupational groups, as concerns IQ, according to a group test. The graph demonstrates that children who go to high school are a selected group, as respects test scores, and that in both elementary school and high school the offspring of various occupational groups differ markedly in caliber. The children of professional men are most intelligent, the middle fifty per cent of them scarcely overlapping at all with the children of laborers. Figure 6 shows how very widely the distribution of intelligence among the offspring of miners diverges from that among the children of lawyers. So great is the difference that the best of the miners' children do not equal the median for children of lawyers.

Only about 1 per cent of the miners' children are as intelligent as 80 per cent of lawyers' children, and no miner's child is as intelligent as the median child of the lawyer group

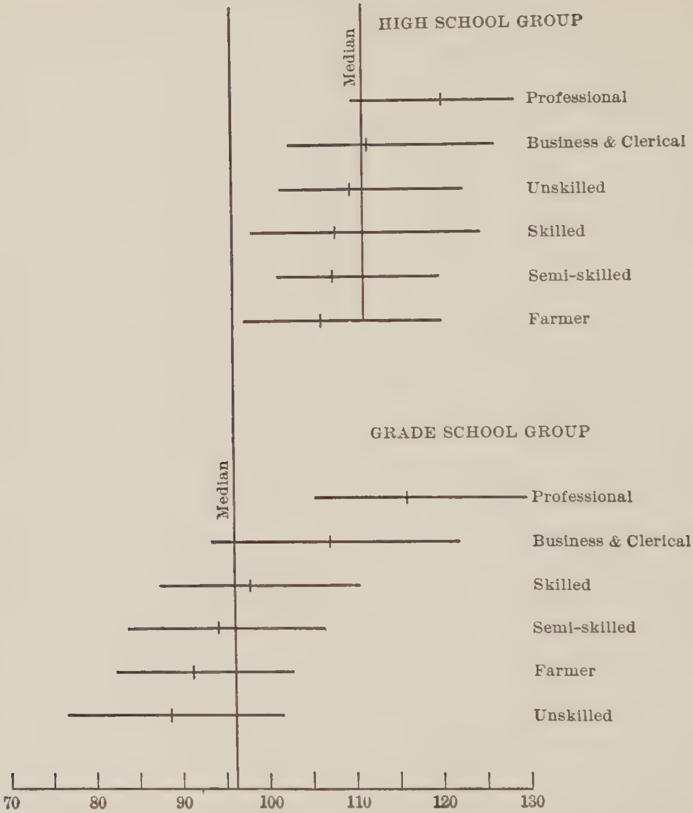

FIG. 5. — Showing spread in IQ of the middle fifty per cent, in grade and high school groups, based on Taussig's classification of parental occupations. (From "Mental Capacity of Children and Paternal Occupation" by Haggerty and Nash. Reproduced by courtesy of the *Journal of Educational Psychology*.)

In addition to the results from investigations like the above, we know that in cities gifted children are much the most likely to be found in schools located in good residential sections, where parents of superior earning capacity live. There is no longer any doubt that in cities and towns gifted children are usually found in good environmental circumstances. Their

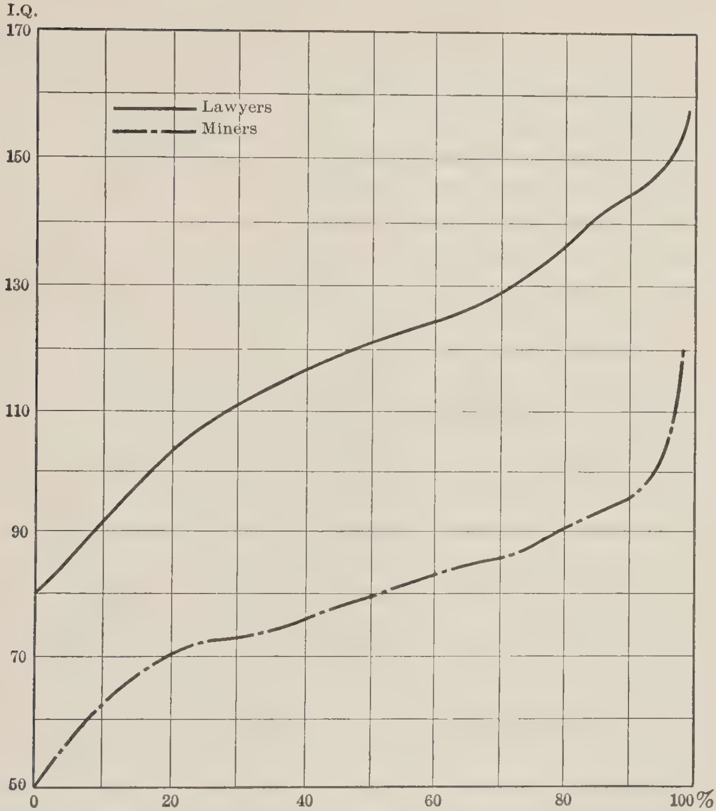

FIG. 6. — Percentile curves showing comparative intelligence of offspring of two occupational groups, miners and lawyers, found in grades III-VIII, in New York State. (From "Mental Capacity of Children and Paternal Occupation" by Haggerty and Nash. Reproduced by courtesy of the *Journal of Educational Psychology*.)

parents have been able to attain and to maintain comfortable or luxurious modes of living in the great majority of cases.

However, a few of the very gifted are born into homes where the father is an unskilled or semi-skilled manual laborer, and are reared without "advantages." These cases teach us that the gifted are not absolutely confined to any one set of environ-

mental conditions, but may occur anywhere (though with extreme improbability under the conditions last described). They also inform us that the intellectual gifts revealed by test are not due to superior environments, but are merely selected by them. If superior environment were the cause of high scores in tests, no child living from birth in squalor could score high.

As regards the comparative frequency of gifted children in urban and in rural environments, we have not much information at present. Such data as bear on the subject indicate that we shall probably find a greater proportion of gifted in the cities, except in districts so remote from means of transportation as to have precluded migration of intellectual deviates to the city. With the easy facilities for travel at present existing almost everywhere in the United States, it is not surprising that we find relatively unintellectual performance in mental tests among rural school children. We find also a low average of achievement in subject matter tests among children in country schools. For instance, a recent survey of ability to read revealed that in rural schools "the median in comprehension, of the eighth grade was below the Monroe standard for the sixth grade," while "in the sixth, seventh, and eighth grades the children had a high rate, but could comprehend little of what they read."

Comprehension in reading is strongly symptomatic of intelligence — much more symptomatic than rate is. These results, therefore, are consistent with the results of group tests of intelligence, which have been given in a few places to rural children and which show a comparatively low average of performance among them. A low average in a population usually implies a scarcity of very able deviates.

It might be inferred that this poor performance of rural children in tests is due to their relative isolation and to poor

schools. Such an inference is controverted by the fact that the more remote the district, the better the performance. Localities very far from cities yield by tests a decidedly greater proportion of very gifted than do rural districts within easier reach of cities. This has been shown in England, both in the Yorkshire dales and in Northumberland. In the latter county, school children were submitted to mental tests in order that candidates for scholarships might thus be selected. Setting forth the outcome of this census, Thomson says:

> The single candidates submitted for scholarships on the test from remote country schools formed a group very noticeably in advance of the average. The highest IQ found (174, the next highest being 153) was of an eight-year-old boy in a small border village, in the heart of the Cheviots, close to the source of the North Tyne. . . . The highest ability appears to be found *close to* the cities and *far away* from the cities, the intermediate areas having fewer cases of high ability, as though they were drained by selection.

We require many additional surveys to determine the census of the gifted in the city and in the country before we can offer absolutely reliable comparative statements. It may be said that present data point to a probably greater proportion, on the whole, of gifted children in cities and large towns. This might be expected, since most rural populations in this country have for some time had access to some means of migration. We cannot, of course, infer that there are no very gifted children now born in rural districts but only that a minority of them are probably born there.

We may summarize present knowledge regarding the environmental status of gifted children by saying that the great majority of them are born of parents who maintain comfortable or luxurious homes and that very probably the city yields more of them than does the country. Both of these conclusions are contrary to inexpert belief, but both of them are in

harmony with facts established previously about the environment of those who attain eminence as adults.

IX. FREQUENCY AS RELATED TO SEX

In considering the studies of eminent adults, set forth in our first chapter, it was stated that relatively few women have attained first-rate eminence by mental work. It was also said that a number of theories have been formulated to explain this fact. Especially those who believe that eminence has little dependence upon opportunity and is to be referred almost wholly to the inevitable working out of innate, hereditary gifts of intellect or talent, have been under the necessity of evolving explanations, since girls have the same ancestry as their brothers.

Almost every thinker who has written on this matter has advanced an explanation different in some respect from those of all others. However, the most plausible theories may be summarized briefly thus: (1) girls do not belong to the same intellectual species as boys, having a different and much lower central tendency; (2) girls have the same central tendency or average intelligence as boys, but they are less variable and do not deviate as far from mediocrity in either direction; (3) girls are relatively noncompetitive and lack the zeal for struggle which is involved in eminent achievement; (4) girls are emotionally unstable and for this reason do not achieve intellectual leadership.

These are the hypothetical explanations suggested by students of achievement who suppose that mental ability and accomplishment are almost perfectly correlated. Others, who hold that there are other important determinants of career, have called attention to the great differences in opportunity which exist between the sexes, as results direct and indirect of the great sex difference in reproductive function.

Even Galton, who held that those "who achieve eminence, and those who are naturally capable, are, to a large extent, identical," recognized that "domestic sorrows, anxieties and petty cares, a yearly child, and periodic infantine epidemics" might cause a man of genius to remain in comparative obscurity. Surely it would seem that the same chain of events must still more severely restrict the performance of equally able women, assuming equally able women to exist.

No direct method of proof or disproof of these various theories has been possible until recently. The method of mental tests is, however, now giving us answers to some of our questions. The tests show how boys and girls are distributed intellectually, from childhood to maturity.

For more than a decade it has been clear that there is no reliable difference between the average boy and the average girl in tests of general intelligence. There is, and for some years has been, almost unanimous agreement among psychologists that there is no need for separate norms for boys and girls in mental tests. Pintner, standardizing tests on several hundred school children, says:

> Sex differences in these tests are too slight to justify separate norms for boys and girls. It seemed, therefore, better to mass all the results together.

Terman says, regarding the outcome of the individual tests given to the 905 school children as shown in Figure 2:

> When the IQ's of the boys and girls were treated separately there was found a small but fairly constant superiority of the girls up to the age of 13 years. At 14, however, the curve for the girls dropped below that for the boys. . . .
>
> The supplementary data, including the teachers' estimates of intelligence on the scale of five, the teachers' judgments in regard to the quality of the school work, and records showing the age-grade distribution of the sexes, were all sifted for evidence as to the genuineness of the apparent superiority of the girls age for age. The results of all these lines of inquiry support the tests in suggesting that the superiority of the girls is probably real up to and even including age 14, the apparent superiority

of the boys at this age being fully accounted for by the more frequent elimination of 14-year-old girls from the grades by promotion to the high school.

However, the superiority of girls over boys is so slight (amounting at most ages to only 2 to 3 points in terms of IQ) that for practical purposes it would seem negligible. This offers no support to the opinion expressed by Yerkes and Bridges that "at certain ages serious injustice will be done individuals by evaluating their scores in the light of norms which do not take account of sex differences."

Apart from the small superiority of girls, the distribution of intelligence in the two sexes is not different. The supposed wider variation of boys is not found. Girls do not group themselves about the median more closely than do boys. The range of IQ including the middle fifty per cent is approximately the same for the two sexes.

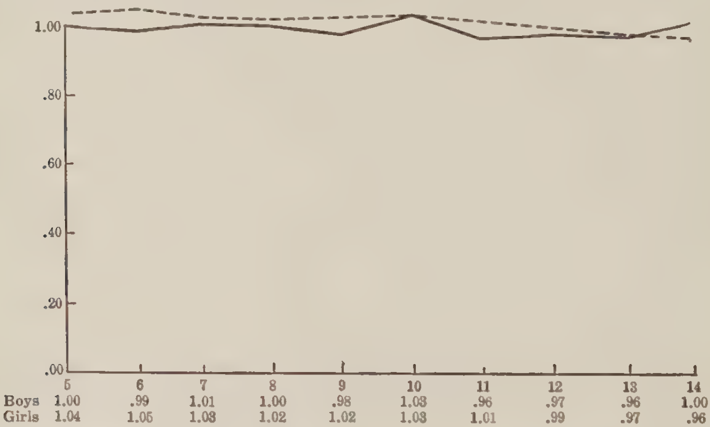

FIG. 7. — Showing the close correspondence in central tendency between the IQ's of 450 boys and 447 girls, of ages 5 to 14 years. (From Terman's *The Measurement of Intelligence*. Reproduced by permission of and special arrangement with Houghton Mifflin Company, the authorized publishers.)

Figure 7, reproduced from Terman's study, shows how closely the average intelligence quotients of boys and girls correspond when impartial samples of about four hundred and fifty of each sex are tested. This finding is typical. There is no longer doubt among psychologists that the central tendency of girls is as high as that of boys, as regards general intelligence.

Still, the proportion of very exceptional individuals might be greater among boys, even though the central tendencies are the same. The *range* or *spread* of the distribution for boys might exceed that for girls. This is the theory of greater male variability, which originated with Darwin, in his observations upon the lower animals. From time to time this theory has been mistaken uncritically for an established fact. Kribs, writing in 1908 from a zoölogical laboratory, notes the theory as follows, in connection with his statistical studies of the beetle, *Carabus auratus*, L.:

> Entirely lacking in definite quantitative evidence in its favor, this general point of view regarding the relative variability of the sexes has been widely prevalent among biologists. Now, it is evident that if this generalization is a valid one, the general principle involved should find expression, in some measure at least, in all sexual organisms. Whether it does or not may be determined in a perfectly definite way by application of modern biometrical methods to the analysis of data collected by actual measurement of various characters in individuals of the two sexes. As a small contribution toward such data, I have determined the chief variation constants of . . . measurements of fifteen similar characters of 84 males and 84 females of the beetle *Carabus auratus*, L.

These sentences, by a zoölogist, are quoted to show the status of the theory of greater male variability in the branch of knowledge where it originated, many years after it had been repeatedly promulgated as an established fact by writers in allied fields.

Among human beings it is very difficult to determine by test whether exceptionally gifted individuals are more frequent among one sex than among the other, because of the fallacies of almost unavoidable selection. The action of those social forces which tend to identify exceptional persons is differential from birth as regards boys and girls.

This fact is perhaps more easily illustrated from the very ungifted than from the very gifted at present, because the former have been much more thoroughly studied. For in-

stance, it was formerly supposed that the preponderance of males in institutions for the mentally defective meant that there are more exceptionally stupid individuals among boys than among girls. In recent years, however, it has been made clear by the method of mental tests that the institutions *select* differentially as regards the two sexes. The girls in such places are fewer but *more stupid* than the boys. In order to be segregated as incompetent for any appropriate career, a girl must be measurably more feebleminded than a boy, on the average. Mental tests of the parents of these inmates furthermore help to show what becomes of some of the stupid girls, who if they had been boys, would undoubtedly have been segregated. Moorrees found that of the parents of feebleminded inmates, the parents being at large and functioning in the community, seventy-one per cent of the mothers fell below the median of the fathers in mental tests.

> If they (the mothers) did not have the earning capacity of the fathers behind them, they could not survive in the struggle, and would eventually have disappeared or drifted to some state institution.

The median IQ of these fathers was 78, which is sufficient for the performance of simple, routine handwork, on a competitive basis. The median IQ of the mothers was 61, which enabled them to function at housework on a noncompetitive basis (support being legally insured by the marriage contract). The preponderance of males in institutions for mental defectives does not mean that there are more exceptional individuals among them. It is merely an index of the extent to which social-economic pressures bear more heavily upon them than upon females of an equal degree of stupidity.

Practically no quantitative studies have as yet been made, to obtain an index of the extent to which social-economic pressures are differential in casting up to notice exceptionally gifted boys or girls. It might, for example, seem at first

thought that the question as to the relative number of gifted among girls could be answered by counting the boys and girls in special classes, where these have been established. Such procedure, however, would lead us into error unless every child of school age in the community has been tested and every child found to qualify above a set minimum has been placed in the special classes, *irrespective of all other considerations.*

One reason for insistence on the above conditions of comparison is that parents have not the same attitude toward their daughters as toward their sons. Girls are not allowed to travel considerable distances or to undertake experimental education as readily as boys. Hence many fail to join these classes, because parents' consent is usually one basis of selection. Again, unless the census is in the first place strictly by mental test, universally applied, more boys than girls will be found, because parents and other relatives more anxiously bring boys forward for prediction about future careers. If straws show which way the wind blows, the following excerpt from a parent's letter may serve as an illustration of the differential action of parental attitude:

> Some time ago I learned that there is someone . . . who is prepared to examine boys with a view of determining abilities, etc. We have three children, – two girls and a boy. Being the only boy in the family, we are naturally anxious to do the best possible for him, and we should be very glad to have an examination of that kind made. . . .

Furthermore teachers' judgments are somewhat differentially biased for boys and for girls. If teachers' estimates are used in preliminary selection, the examiner obtains for consideration many girls who are pretty, ladylike, and "dear," but who are not highly gifted intellectually. Boys are probably not so liable to be mistaken on this basis.

These observations have not the force of demonstrated fact, but one instance is available, which may be stated quantita-

tively in support of them. In New York City, where children were being selected for special classes for gifted children, parents and teachers as usual suggested more boys than girls as candidates. This alone might mean that there are more of the former than of the latter. Among those chosen from these candidates by mental test as of the requisite degree of intellect, only thirty per cent of the fifty allowed to attend the classes were girls; but of the thirty children whose parents refused permission, or who for other reasons could not join the classes, sixty per cent were girls. This is a quantitative indication, however tentative and slight, of the differential action of the environment in determining the proportion of each sex in special segregations of the gifted.

Other possible fallacies, aside from the pitfalls of selection, must be kept in mind when attempting a comparative census of the sexes. For example, it is not possible to rely even upon the gross number of each sex found in a stringently impartial test of all school children, since more boys than girls are born. This fact is apparently not widely known to educators. The ratio of boys to girls born the civilized world over is about 106 : 100. We may expect to find a greater number of gifted among boys, even if the sexes yield gifted individuals equally often. The comparative census must, therefore, always be stated in terms of proportion to have proper significance.

There has not as yet been a census of the gifted as related to sex which avoids all the possible errors that have been mentioned. The nearest approach we have to such a census is found in the recent investigations of Terman. In making the Stanford revision of the Binet-Simon tests, during the course of which the 905 school children shown in Figure 2 were tested, Terman found no difference in variability between boys and girls. The proportion of gifted and of markedly inferior intellects was the same for both sexes.

In the years following this research, Terman undertook to locate, in the state of California, children testing above 140 IQ. By the spring of 1921 he had thus found one hundred and eighty children. The sex ratio among the cases was 60 : 40, boys preponderating. Above 160 IQ the ratio was 65 : 35, and above 180 IQ, it was 70 : 30. These data were, however, collected in an unsystematic manner, by testing *children brought to attention*, so that the ratios are liable to all the fallacies we have mentioned. Terman fully recognized these fallacies, in announcing the ratios. His chief purpose was not to determine sex ratios but simply to find gifted children regardless of sex, by means available.

At this point in his work Terman was aided by the Commonwealth Fund to undertake investigations on an increased scale. The method of taking the census was now systematized to some extent. Teachers' judgments were used to make a preliminary selection of the three brightest children in each grade. To these were added the children ranking in the top five per cent in a group test, and the youngest in each grade. Children thus selected were examined to find those who could score at or above 140 IQ.

With this degree of systematization, the sex ratio fell to 55 : 45 in favor of boys. In 1924, Terman reported that 672 children, testing above 140 IQ, had been located for study by the methods of selection just described. Of these, 360 were boys and 312 were girls. This is in the ratio of 115.38 boys to 100 girls.[1] In the schools attended by these children, the proportion of boys to girls is 104.55 : 100.

In the most extensive census at present available, therefore, among school children testing above 140 IQ, the ratio of boys to girls is 111 : 100 when allowance is made for the greater number of boys born. The three highest cases —

[1] The standard deviation of the proportion is 1.92.

those ranging farthest from mediocrity — were girls, all with IQ above 190.

In Germany, Peter and Stern, testing large groups for children of promise in the *Volkschulen*, report that "the girls do as well as the boys. The ten best girls equal the ten best boys in performance."

As in questions pertaining to the relation between intellect and environment, we require much more rigidly systematic and more extensive surveys in order to state the exact relation between sex and exceptional intellect among children. It may certainly be said now, however, that mental tests have given no explanation of the great disproportion of eminence among men. If, for instance, the figures quoted above from Terman were ultimately proved to hold for perfectly systematic search, then on the basis of mental gifts alone we should expect for every hundred and eleven men of eminence for intellectual work one hundred women of equal eminence. Moreover, the most eminent persons should be women (since the highest IQ's found were those of girls).

As this is by no means what history reveals (though we know that intellect in childhood is predictive of intellect in maturity) we must assume that there are powerful determinants of eminence beside intellect. It will be particularly interesting to observe the development and the adult careers of little girls who test above 170 IQ. It will be of social value to observe the deflections from possible eminence which they meet, and to see how many will survive "domestic sorrows, anxieties and petty cares, a yearly child, and periodical infantine epidemics."

X. FREQUENCY AS RELATED TO RACE

So few data have been gathered to show the proportion of gifted children in relation to race, that it is perhaps scarcely

worth while to discuss the topic except to say that we are ignorant of the facts. We have, however, a few studies of the proportion of gifted in samplings of the various races *found at present in the United States.* Obviously to determine the proportion of gifted children among Italians, for instance, or among Scotchmen, who are in the United States, is not the same as to determine the proportion among the Italian people, or among the Scotch people as a whole. Here again selection enters into the reckoning. There is no reason to suppose that we have received from any country, at any time, a perfectly random sample of that country's population. As regards these various immigrants, we can be almost certain that we have received very unequally from the noble, the wealthy, and the educated as contrasted with the peasantry, the poor, and the ignorant. We must in reason suspect that the literate peoples who came here in the seventeenth century, to a wild country, in order to obtain freedom for religious ideas, constituted a very different "sampling" from the illiterate peoples who came here in the twentieth century, when the country was rich and prosperous, to earn money. The migration of peoples is always on the basis of some motive which selects unequally, according to the motive, among the total population from which the emigrants go. The United States has received *selections* from the various nationalities and races of the world; so we cannot generalize the results of tests made here to include any mother population as a whole.

With this proviso we may proceed to study the findings of the few investigations carried out in this country. Several surveys have been made to test the mentality of negro children. These surveys unexceptionally show a low average of intellect among children having negro blood. Comparatively few of these children are found within the range which includes the best one per cent of white children. It is, however, possible

by prolonged search to find an occasional negro or mulatto child testing above 130 IQ. The present writer knows of a family of five mulatto children, all of whom test between 130 and 170 IQ. This family is extremely exceptional, according to the researches which have been made, and which are cited specifically in the appended list of references. The tests have been made by various psychologists, in widely separated sections of the country. Their combined and consistent result must be considered more than a mere suggestion that negro children furnish fewer gifted individuals than white children do, in the United States. This agrees also with the army tests of negro recruits, showing few gifted adults among them.

Of the children in California testing above 140 IQ, Terman says:

> There is a marked excess of English, Scotch, and Jewish parentage. A tenth of our main group are Jewish, as compared with about five per cent in the general population of these cities. The proportion of Mexican, Spanish, Italian, Portuguese, and negro origin is very low.

Among pupils qualifying for special classes for the gifted in the public schools of New York City there is a marked excess of Jewish parentage. This fact cannot, however, be interpreted in the present connection because, in New York City, school children are very largely segregated — to some extent on a religious basis — into parochial, private, and public schools. It is especially to be noted that children of well-to-do Catholic parents commonly attend parochial schools where tuition is paid. Thus these children, many of whom are very gifted, are not included in any public school census because their parents have chosen parochial schools for them.

As a result of unsystematic search, extending over six years, among pupils in both public and private schools, in New York City and its suburbs, the present writer has found six children

testing above 180 IQ. Of these extremely gifted individuals, three are Jewish, one is Scotch-German, one Scotch-English, and one Irish-English in ancestry. This array of origins is interesting in view of Terman's findings on the Pacific coast, that very gifted American children are disproportionately Scotch, English, and Jewish in derivation. In connection with these findings it may be noted that Woods conducted in 1914 a study of the racial origin of successful American adults and concluded that

> Those of English and Scotch ancestry are in possession of the leading positions, at least from the standpoint of being widely known, and that in proportion to their number, the Anglo-Saxons are 3 to 10 times as likely as are the other races to achieve positions of national distinction.

One other result recurs persistently wherever American children are tested by nationality of ancestors. American children of Italian parentage show a low average of intelligence. The selection of Italians received in this country has yielded very few gifted children. This inferiority is not referable to "language difficulty," for children of Swedish and Jewish parentage, under the same handicap of foreign language, show a much higher average in the tests.

There is little more to be said, in the present state of ignorance, concerning the proportion of gifted children occurring by race or nationality. The subject is of great importance to education and to politics, and deserves thorough study. No doubt it will be studied thoroughly within the next hundred years.

XI. UNINTENTIONAL SEGREGATION OF GIFTED CHILDREN

The methods of mental measurement have demonstrated that even in the United States, where we had supposed all children to be mingling freely with others of "every walk of life," segregations of the gifted have unintentionally occurred

to a marked extent. These segregations have come about on the basis of social and economic selection. It was not a conscious purpose to segregate the gifted from those of inferior intellectual powers, but this automatically happened, as able parents strove to keep their children clean, free from crowds and contagion, and to secure for them the benefits of teaching in small and congenial groups. These segregations of children are peculiar to congested or heterogeneous populations. In this country, therefore, they have taken place chiefly east of the Allegheny Mountains. In the West and Middle West there are not many private schools. In the large cities on or near the eastern seaboard, private schools are numerous.

Before mental surveys had been made in private schools, it was quite generally thought that they might harbor many stupid children, in consideration of tuition fees; that those who were incompetent to advance in the public schools probably had recourse to them. Mental tests have dissipated this erroneous supposition. Children in elementary schools where tuition is paid are so highly selected for mental endowment that almost none fall below 100 IQ. This means that nearly the whole less intelligent half of the juvenile population is excluded from them. It seems that parents who can pay for private education have few children of low IQ to present.

Some of the surveys showing the above facts have been published. In the Hotchkiss School, Anderson gave mental tests (Army Alpha, Form 6), and compared the scores made by the boys with those of boys in three public high schools, measured previously by Madsen and Sylvester. The boys compared were of the same ages, so that no advantage accrues to either group from age. The results show clear intellectual superiority in every class in secondary school, for the Hotchkiss boys. The results are stated in terms of points scored, as follows:

	Lower Quartile	Median	Upper Quartile
First Year			
Hotchkiss	114	126	140
Three public high schools .	87	102	121
Second Year			
Hotchkiss	132	144	159
Three public high schools .	100	116	132
Third Year			
Hotchkiss	139	154	165
Three public high schools .	110	126	143
Fourth Year			
Hotchkiss	142	156	166
Three public high schools .	115	134	150

Eighty-five per cent of the Hotchkiss freshmen exceed the median score of public high school boys. In the second year, ninety-five per cent of Hotchkiss boys exceed the median of the comparative group; in the third year, eighty-eight per cent; and in the fourth year, eighty-five per cent. Thirty per cent of boys who reach the fourth year at Hotchkiss are of A intelligence — intellectually gifted — as compared with ten per cent in the public high schools. It follows that this private school educates a very disproportionate number of gifted boys. The parents of these boys pay an annual tuition amounting to nearly the total income of an average family in the United States. This means that the boys are sons of parents having qualities making for economic success. There are, it is true, scholarship boys in the school, who pay no tuition, but they are rigorously selected for ability before admission.

In the Foxborough School (a private elementary school) Malherbe found the mean IQ of the pupils to be 125, instead of 100. In the Horace Mann School, the mean is between 115 and 120. In the Ethical Culture School it falls near 125. These schools are typical of private schools known to the present writer, many of which have never made public

reports. The intelligence of pupils in private schools is very superior. Principals and teachers of such schools often recommend for mental examination as "dull" children who test at or slightly above IQ 100. Children of average ability in these schools seem dull by comparison with classmates.

Also, it has not been realized and even now is realized by very few, that pupils in public high schools form a selected group as regards intellect. It has been supposed that attendance at high school has been largely a matter of interest, effort, and economic status as distinct from intelligence. One who is familiar with the meaning of scores on tests sees at once by inspection of the comparison between the Hotchkiss School and the public high schools that pupils of the latter are distinctly above the average of the population in intelligence. The average score of adults the country over on Army Alpha is below 75 points. The public high school boys, in every grade, average well above that score.

Private schools, both elementary and secondary, and public high schools are therefore efficient selectors of gifted children. It has already been stated that the gifted are most likely to be found in schools, public or private, which are located in good residential districts. The various schools of a city differ very greatly in the proportion of gifted found in them.

Not only in this country, but in England also, certain schools have been shown to select the gifted. Burt demonstrated several years ago that boys attending one of the famous preparatory schools of England are intellectually much superior to the average of the British school population.

SUMMARY OF THE FACTS

We may now summarize the facts accumulated from such census as has been taken of children grading in the highest one per cent for general intelligence. It has been shown that

teachers' judgments of the gifted are very faulty, and that parents' judgments are more faulty still. Gifted children usually receive high marks in school subjects, are recognized as "old for their age," and are most often found to be youngest or next to youngest in their classes. Nothing so readily and accurately identifies a gifted child as a good mental test given individually. By means at present available, identification is more reliable with older than with younger children.

The gifted most often originate in families where the father earns his living by mental work, and where the parents maintain comfortable or luxurious homes. Probably they are most often born in cities or close to cities. They seldom come of fathers who are manual toilers, and almost never from those who are unskilled.

As regards the proportion of gifted among boys and among girls respectively, it is difficult to obtain reliable figures, because of fallacies of selection, where estimates enter into the preliminary census. The most extensive census available gives a net proportion of 111 boys to 100 girls testing above 140 IQ.

As regards race, we have few facts. In the United States it has been found that negro children furnish relatively few of the gifted, and that children of Italian parentage furnish nearly as few. American children of English, Scotch, and Jewish descent seem especially frequent among the very gifted.

To find most easily and quickly a group of gifted children, one should go to a private school, or to a public school in an excellent residential section of a city, and ask for children who are young for their classes, and whose fathers are professional men.

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CHAPTER IV

Physique and Movement

I. MISCONCEPTIONS AND SUPERSTITIONS

There is current a belief that very bright children are likely to be puny, weak, and undersized. It is supposed that the brain is active at the expense of the body, and that the health is liable to deterioration in consequence. Thus the scholar has come down to us in poetry "sicklied o'er with the pale cast of thought." When the cartoonist wishes to portray the bright child, he draws a species of monstrosity, with large head, spindle legs, and a facial expression of deep melancholy. The child-prodigy is supposed to die young.

These misconceptions are so out of harmony with the facts about the physique of gifted children that it is hard to tell why they should have been formulated and should have achieved such wide currency. Perhaps they have their remote source in human longing for a "just nature," that is, for a nature that will make an even distribution of gifts among us and see that he who has a fine mind shall not also have health, strength, dexterity, and beauty. They arise, also, from certain almost unavoidable fallacies in human judgment, which we are about to discuss.

In studying eminent persons, Galton noticed how contrary to the popular idea were his observations of the physique of the renowned, and he made the following comment:

> There is a prevalent belief that men of genius are unhealthy, puny beings — all brain and no muscle — weak-sighted, and generally of poor constitutions. I think most of my readers would be surprised at the stature and physical frames of the heroes of history who fill my pages, if they could be assembled together in a hall. I would undertake to pick

out of any group of them, even out of that of the Divines, an "eleven" who could compete in any physical feats whatever, against similar selections from groups twice or thrice their numbers, taken at haphazard from equally well-fed classes. In the notes I made previous to writing this book [*Hereditary Genius*], I had begun to make memoranda of the physical gifts of my heroes, and regret now, that I did not continue the plan, but there is even almost enough printed in the appendices to warrant my assertion. I do not deny that many men of extraordinary mental gifts have had wretched constitutions, but deny them to be an essential or even a usual accompaniment. University facts are as good as any others to serve as examples, so I will mention that both high wranglers and high classics have been frequently the first oarsmen of their years. The Hon. George Denham, who was senior classic in 1842, was stroke of the University crew. Sir William Thompson, the second wrangler in 1845, won the sculls. In the very first boat-race between the two Universities, three men who afterwards became bishops rowed in one of the contending boats, and another rowed in the other. . . . A collection of living magnates in various branches of intellectual achievement is always a feast to my eye; being, as they are, such massive vigorous, capable-looking animals.

Actual measurements to show the size and strength of intellectually eminent adults, as compared with average men, have seldom been taken. Such measurements, in any case, are ambiguous in meaning, as regards the relation existing between size and intellect. Gowan, for instance, measured men in superior executive positions and found such men tall and heavy as a group. But this may only mean that physical size is itself a determinant of success; and if so, there may be an uncounted number of the mentally gifted who have failed to achieve conspicuous place through lack of size.

The relationship between physique and intellect may best be found by taking measurements of each, disregarding achievement (which may depend on a combination of the two). Such measurements have been made in the case of children. It will be well to consider them in some detail.

II. STATURE

The standing height of children testing above 135 IQ has been studied by Baldwin and Terman and by Hollingworth

and Taylor. The former measured the children testing above 140 IQ, located in the California survey. They reported in 1924 that anthropometric measurements "show a superiority of the gifted group over Baldwin's unselected cases, in most

Tabulation showing how height (in inches) is distributed among three groups of children, 9–11 years old — age, race, and sex being constant in the three groups.

Inches	Group A IQ above 135 (Median IQ, 151)	Group B IQ 90–110 (Median IQ, 100)	Group C IQ below 65 (Median IQ, 43)
59	1	—	—
58	—	—	—
57	3	—	—
56	4	1	—
55	4	1	1
54	8	2	3
53	2	3	4
52	9	8	2
51	8	10	3
50	3	7	6
49	1	8	10
48	2	5	3
47	—	—	3
46	—	—	5
45	—	—	2
44	—	—	—
43	—	—	1
42	—	—	1
41	—	—	—
40	—	—	1
Total	45	45	45

of the 34 measurements taken," but no precise calculations were presented. These were, however, published in 1925, with elaborate computations.

In 1924 Hollingworth and Taylor measured forty-five

school children, who had previously been selected by mental tests, without regard to physique. They ranged from 135 IQ to 190 IQ, with a median at 151 IQ. They were all between the ninth and eleventh birthdays. These children, having first been chosen by mental tests, were then measured for height in inches, and their measurements were carefully compared with those made previously by another investigator, Tirapegui,

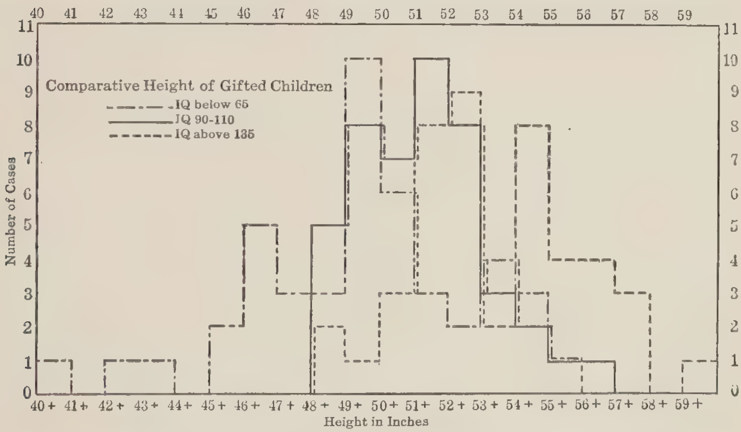

FIG. 8. — Showing comparative distribution of height in inches, for three groups of children, selected by mental tests, and matched child for child, by age, race, and sex. (From "Size and Strength of Children Who Test above 135 IQ" by Hollingworth and Taylor. Reproduced, by courtesy of The National Society for the Study of Education, from *The Twenty-Third Yearbook*.)

on children chosen by mental tests from the middle fifty per cent of intellects, and from the lowest one per cent, respectively. To form the three comparative groups, each gifted child was matched with a child testing between 90 and 110 IQ and with another testing below 65 IQ, keeping age, race, and sex as the bases of matching and paying no attention whatever to size. Thus differences in size due to age, race, and sex were eliminated. As the intelligence of each group had

been prescribed before the physical measurements were taken, the only factor of interest allowed to vary as it would was the factor of physique. The comparison is, therefore, nearly

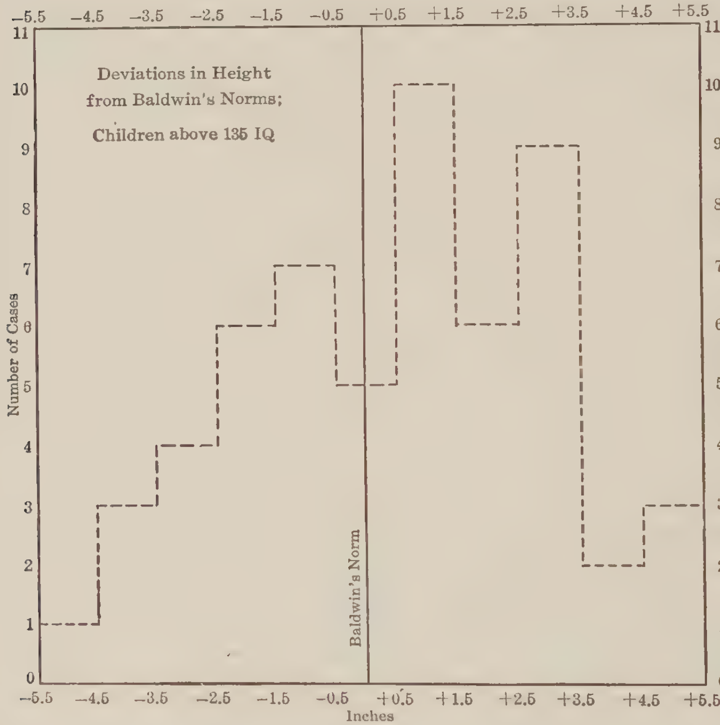

FIG. 9. — Showing how the very gifted compare with children in the private schools, as regards stature in inches. (From "Size and Strength of Children Who Test above 135 IQ" by Hollingworth and Taylor. Reproduced, by courtesy of The National Society for the Study of Education, from *The Twenty-Third Yearbook*.)

ideal for its purpose, which is to determine how much, if at all, physique varies with intelligence.

As the gifted children here involved were in a special class, admission to which had been by parents' consent as well as

by mental test, the children who had qualified by test but whose parents had not permitted them to join the group were later measured, to make sure that the children of the class did not constitute a selection of the gifted on the basis of size. (Parents might, perhaps, have refused permission to their relatively small children.) The measurements of those not in the class, however, did not differ in trend from those to whom permission had been granted. The size of the forty-five children here presented is, therefore, thoroughly representative of the gifted.

The table on page 80 and Figure 8, accompanying it, show the greater height of the gifted children. The gifted group has a median height of 52.9 inches, as compared with a median of 51.2 inches for the children of average intelligence, and of 49.6 inches for the very stupid.

These children, with eleven others of the same mental caliber, forming a group of fifty-six, were also matched by the investigators against Baldwin's norms for children in private schools, whose median IQ is about 120. Figure 9 shows how the very gifted exceed even the superior children in private schools, who in turn exceed unselected children. Thirty-five of the fifty-six gifted children exceed Baldwin's norms by more than one-half inch, at the ages mentioned.

III. WEIGHT

The gifted are, therefore, taller than unselected children, and they are even more conspicuously heavier. The children measured by Hollingworth and Taylor, described above, were measured also for weight, with the results shown in Figure 10, and in the accompanying tabulation.

Figure 11 shows how much heavier the very gifted are than the private school pupils measured by Baldwin, though the latter are in turn heavier than children measured at random.

Terman found that children now testing above 140 IQ were at birth about one pound heavier, on the average, than are

Tabulation showing how weight (in pounds) is distributed among three groups of children, 9–11 years old — age, race, and sex being constant in the three groups.

Pounds	Group A IQ above 135 (Median IQ, 151)	Group B IQ 90–100 (Median IQ, 100)	Group C IQ below 65 (Median IQ, 43)
115–110	2	—	—
110–105	—	—	—
105–100	—	—	—
100– 95	2	—	—
95– 90	2	1	—
90– 85	3	1	—
85– 80	6	2	1
80– 75	5	1	2
75– 70	9	6	6
70– 65	4	10	3
65– 60	8	9	8
60– 55	3	9	13
55– 50	1	5	4
50– 45	—	1	6
45– 40	—	—	2
Total	45	45	45

unselected infants, according to the baby-books kept by their mothers.

IV. WEIGHT-HEIGHT COEFFICIENT

The superstition that very bright children are inclined to be thin and frail receives an especially pointed correction from inspection of the facts with regard to the relationship prevailing between their height and weight. The weight-height coefficient, found by taking the ratio between weight and height (Wt. ÷ Ht.), is sometimes used as an index of nutrition.

The graph in Figure 12, with its accompanying table, shows the distribution of weight-height coefficients for the three comparative groups of children measured by Hollingworth and Taylor. The gifted group considerably exceeds the others

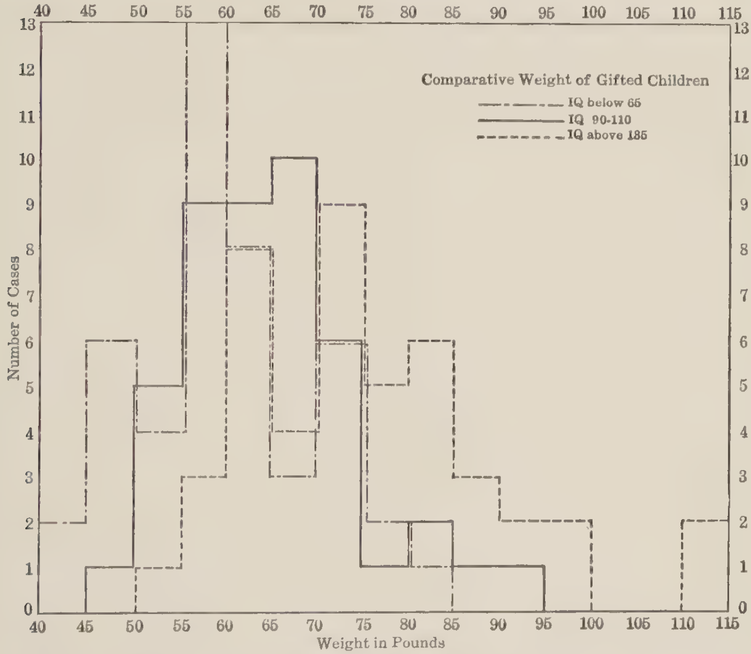

FIG. 10. — Showing comparative distribution of weight in pounds, for three groups of children, selected by mental tests, and matched child for child, by age, sex, and race. (From "Size and Strength of Children Who Test above 135 IQ" by Hollingworth and Taylor. Reproduced, by courtesy of The National Society for the Study of Education, from *The Twenty-Third Yearbook*.)

in amount of weight per unit of height. They are not only heavier, but are *heavier for their height*, than average children, age for age. The gifted are very well nourished according to the weight-height coefficient. Plump individuals are frequent among them.

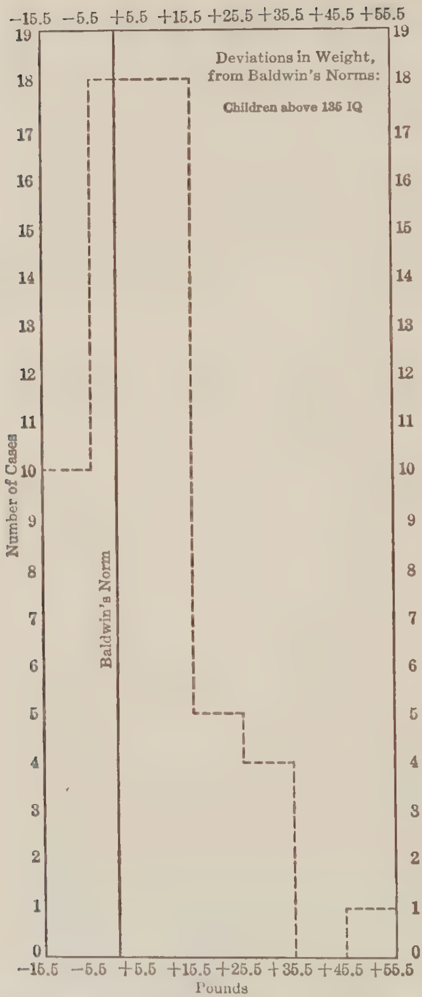

FIG. 11. Showing how the very gifted compare with children in private schools, as regards weight in pounds. (From "Size and Strength of Children Who Test above 135 IQ" by Hollingworth and Taylor. Reproduced, by courtesy of The National Society for the Study of Education, from *The Twenty-Third Yearbook*.)

Figure 13 shows how markedly the gifted exceed even Baldwin's norms for children in private schools, in this regard. Underweight is much less frequent among them than among children unselected for intelligence.

In the nutrition clinic, established some years ago at Public School 64, Manhattan, it was undertaken to eliminate underweight among the pupils by various means, including education. Among the very thin children were a few of superior intelligence. The records of the clinic show that these gained in weight more successfully than did those of less intelligence. Probably this is correctly to be attributed to their greater capacity for profiting by instruction.

V. SIZE AND SHAPE OF THE HEAD

Cranial measurements are, perhaps, among the most interesting, in studying the physique of the gifted, because it might be supposed that these would be most intimately related to size of brain, and that size of brain might, in turn, be intimately related to intelligence. The cartoonist evidently believes that the heads of the gifted are disproportionately large.

Many years before mental tests had been developed to a point of practicability, cranial measurements had been made to compare children who do well in school with those who do poorly, and those whom teachers judge as highly intelligent, with those whom they judge to be stupid. Here, again, the fallacies are present which creep in when achievement is a basis of choice, but it is worth noting that these measurements showed children thus classified as superior to have slightly larger heads, as a group, than those thus classified as inferior mentally. The former were also found, in such studies, to exceed the latter in height, weight, and other physical traits, though with a great amount of overlapping between the groups.

Tabulation showing how weight-height coefficients are distributed among three groups of children, 9–11 years old, — age, race, and sex being constant in the three groups.

Wt.-Ht. Coefficients	Group A IQ above 135 (Median IQ, 151)	Group B IQ 90–110 (Median IQ, 100)	Group C IQ below 65 (Median IQ, 43)
210–205	1	—	—
205–200	—	—	—
200–195	—	—	—
195–190	—	—	—
190–185	—	—	—
185–180	1	—	—
180–175	—	—	—
175–170	—	—	—
170–165	3	—	—
165–160	—	1	—
160–155	1	—	—
155–150	1	—	—
150–145	2	1	—
145–140	3	3	2
140–135	3	2	—
135–130	8	4	5
130–125	5	2	5
125–120	3	5	3
120–115	4	7	4
115–110	5	6	8
110–105	4	7	3
105–100	—	3	5
100– 95	1	1	5
95– 90	—	3	2
90– 85	—	—	2
85– 80	—	—	1
Total	45	45	45

Cranial measurements of children classified for intelligence in terms of IQ have been made in sufficient numbers so that we know something of the comparative size of the heads of the gifted. The measurement of cranial diameters is a delicate matter, for the measurements are taken in millimeters, so that it is almost impossible to avoid the influence of the examiner's personal equation in measuring, the units being so minute. It

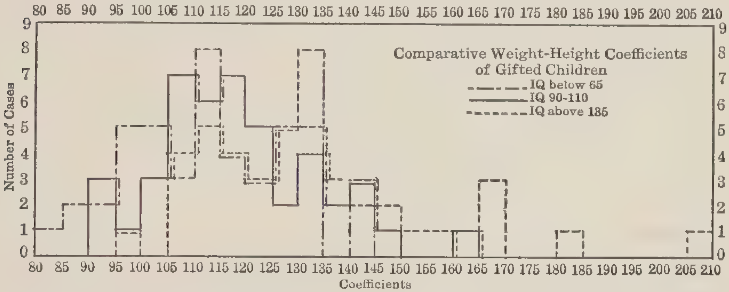

FIG 12. — Showing comparative distribution of weight-height coefficients for three groups of children, selected by mental tests, and matched child for child, by age, sex, and race. (From "Size and Strength of Children Who Test above 135 IQ" by Hollingworth and Taylor. Reproduced, by courtesy of The National Society for the Study of Education, from *The Twenty-Third Yearbook*.)

is desirable, therefore, that the measurements of comparative groups should all be made by the same examiner, or else that two examiners should make measurements independently upon any group, which is to be compared with groups previously measured elsewhere. Even with the use of so accurate an instrument of precision as steel calipers, personal strictness or personal laxity may create a constant error amounting on the average to one or two millimeters, or even more, in taking cranial diameters.

As regards cranial circumference, it is well to be reminded that this dimension is very much subject to variation, from time to time, even in the same individuals, because it includes

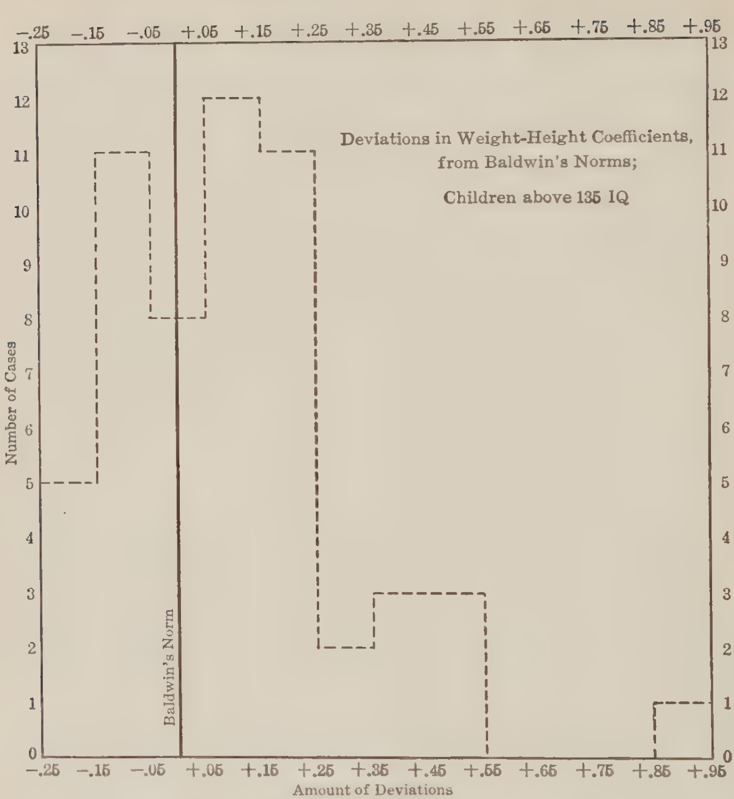

Fig. 13. — Comparison of very gifted with children in private schools (Horace Mann and Francis Parker Schools) as regards weight height coefficient. (From "Size and Strength of Children Who Test above 135 IQ" by Hollingworth and Taylor. Reproduced, by courtesy of The National Society for the Study of Education, from *The Twenty-Third Yearbook*.)

hair. For instance, a group of boys measured for cranial circumference, upon reëntering school in the autumn, showed a smaller circumference than they had shown in the preceding spring, because several of them had had their hair newly cut upon reëntering school.

Bearing in mind these sources of error, we may present such

data as we have regarding size and shape of head. The gifted children whose stature and weight has already been described here were later measured for maximum length of head, for maximum width of head, and for cranial circumference. Each measurement was taken three times on the same occasion by the investigator, and the median of the three was recorded. Cranial dimensions as thus determined were compared with those of children testing between 90 and 110 IQ, matched child for child, exactly by age, race, and sex, from a group previously measured by another investigator. Measurements thus made and compared yielded the following tabulation of results:

	Maximum Length of Head (mm.)	Maximum Width of Head (m.m.)	Circumference of Head (cm.)	Cephalic Index
Gifted group . .	182.26	146.48	53.54	.805
Control group .	177.26	147.66	52.63	.835
Probable error of difference . .	.942	.708	.206	.005

The gifted have, therefore, larger heads than the ungifted, but only in accordance with their greater size in other respects. There is an interesting difference also in shape of head, between gifted and ungifted, in so far as shape is shown by cephalic index (which is the ratio found between width and length). There is no reliable difference between the two groups in width of head, as indicated by the probable error of the difference. There is, however, a reliably greater *length* of skull among the gifted. The gifted tend to be *long-headed* in comparison with their ungifted contemporaries of the same age, race, and sex.

Here again it must be pointed out that the overlapping in both size and shape of skull between gifted and ungifted is so extensive that intellect cannot be safely inferred from cranial dimensions in an individual case. The chances are

more than even that a long-headed child will be very intelligent, but they fall far from certainty for an individual chosen at random.

It seems possible that the use in popular speech of the term "long-headed" to signify intelligent or "smart" may have had its origin in common observation of the fact that intelligence and long skulls are often found together.

VI. GENERAL REMARKS

Measurements of physique other than those of the cranium, of stature, and of weight agree also in showing that size of body is positively correlated with intellect. However, the correlation is not so close that the one may be inferred reliably from the other in an individual case chosen at random.

In fact the graphs show that some of the most stupid (those in the lowest one per cent for intellect) are larger than some of the most gifted (those in the highest one per cent for intellect). The amount of this overlapping of one intellectual group upon the other as regards size is shown in the following table, taken from the work of Hollingworth and Taylor:

Tabulation showing medians, median deviations and overlapping upon medians, in the case of three groups of children 9–11 years old, age, race, and sex being constant in the three groups.

	Gifted		Ordinary		Stupid		Per Cent of Ordinary Who Reach or Exceed Median of Gifted	Per Cent of Stupid Who Reach or Exceed Median of Gifted	Per Cent of Stupid Who Reach or Exceed Median of Ordinary
	Med.	Med. D.	Med.	Med. D.	Med.	Med. D.			
IQ . . .	151	9	100	8	43	10	0	0	0
Age (mos.)	117	4	117	5	116	4	58	45	45
Ht. (in.) .	52.9	1.6	51.2	1.2	49.6	2.1	20	18	28
Wt. (lbs.) .	74.0	9.4	63.9	5.2	59.5	6.5	18	9	36
Ht.-Wt. Coefficients	1.31	.13	1.19	.10	1.14	.12	24	16	36

FIG. 14. — Photograph of a group of eleven-year-old boys, all testing above 140 IQ, showing individual differences in size, with general tendency to be larger than average. The boy on the left, designated by an arrow, is just average in size for this age.

FIG. 15. — Photograph of a group of eleven-year-old girls, all testing above 140 IQ, showing individual differences in size, with general tendency to be larger than the average. The girl on the left, designated by an arrow, is just average in size for this age.

The three groups, chosen on the basis of intellect, form an ascending series morphologically, from least gifted to most gifted. However, there is a considerable amount of overlapping of the lowest group, upon the median of the highest, in each physical trait.

Figure 14 shows by means of a photograph what has just been stated verbally and numerically. We have here a number of eleven-year-old boys, who form a part of the gifted group appearing in the tables and graphs preceding, at an earlier age. Figure 15 shows gifted girls eleven years old, also included when they were nine years old in the investigations cited. These children all test above 140 IQ (Stanford-Binet). Selected originally by intellect alone, without reference to size, we find them nearly all above the average in stature. The child in each group who typifies the average eleven-year-old in size is indicated.

Figure 16 shows a photograph of two very gifted boys, of the same race, age, and school standing, and of the same IQ, who differ greatly in physique. The smaller boy achieves as much in school work as does the larger, with equal ease, and is at the same time the president of his class and one of its recognized leaders. Such instances give point to the finding, which we are about to consider, that children cannot be graded for "social age" by physique nor can they be selected for placement at school by physical measurements.

VII. PHYSIOLOGICAL MATURATION

Size is properly regarded as one indication of degree of physiological maturation, but as size varies with so many factors other than maturity, it scarcely constitutes the most reliable evidence. Criteria other than size, of physiological maturation, which have been studied in relation to intelligence, are ossification of carpal bones and onset of puberty.

FIG. 16. — Showing two very gifted classmates of the same age, race, and IQ, differing greatly in physique. The smaller boy is 10 years 9 months old, is 50.0 inches tall, and weighs 63.5 lbs. The larger boy is 10 years 5 months old, is 60.2 inches tall, and weighs 99.0 lbs. The IQ's are exactly the same, but will not be stated precisely here for reasons of deference to the boys concerned.

By means of radiographs, the degree to which ossification has taken place in bones may be determined. Baldwin especially has argued that ossification of the wrist bones is an important criterion of mental status, which should be applied in placing school children in appropriate grades. It is not clear upon what evidence this argument is based, and no data are offered in support of it. Other recent investigators, notably Gates, Prescott, and Carter, have shown that when birthday age is neutralized as a factor, the correlations between ossification of bones and mental capacity are too slight to be useful in consideration of individual cases.

For example, from very careful statistical studies made on pupils in the Horace Mann School, Gates obtained coefficients clustering around .15, for degree of ossification as correlated with degree of mental capacity. Since perfect correspondence would yield a coefficient of *unity*, or 1.00, we see that the relationships expressed by .15 are too slight to be useful in placing individuals. As in the case of height and weight, there is much *overlapping* between stupid and gifted, in degree of ossification of carpal bones.

It is to be considered that in dealing with children in the Horace Mann School, Gates worked with pupils representing a restricted range of intelligence. If an unselected group of children had been studied, the correlation would unquestionably have been greater. Nevertheless, we may safely infer that a correlation coefficient as low as .15, obtained from as wide a range of intellect as is represented in this school, would not be increased to anything like practical significance by including the total range of intellect in the investigation.

Freeman and Carter summarize their findings thus:

It has been suggested that children be classified in school on the basis of their physical development, as measured by such an index as ossification ratio. Two issues are involved, the adjustment of school

organization to social development, on the one hand, and to intellectual development on the other hand. Promotion according to anatomical development is proposed on the ground of its relationship both to social and to intellectual development. We are here concerned only with the latter. Our data show that the child's capacity to do advanced intellectual work cannot be measured by his rate of anatomical development. The child's variation in mental development must be measured by mental tests, and it cannot be inferred from the results of physical tests. Classification should be based primarily on measures of intellectual growth and capacity, and only secondarily, if at all, upon measures of physical growth and capacity.

Actual data, collected and correlated, show, therefore, that a group of very intelligent children will be a little more advanced than a group of stupid or mediocre children, as regards ossification of the bones. The amount of overlapping among various intellectual categories will, however, be so great as to render this criterion of little value in predicting the kind of intellectual work which is suitable for a given child.

Concerning the second process of physiological maturation, which has been studied in relation to intelligence, namely pubescence, Terman has given the following figures for the gifted. Of the twelve-year-old gifted boys studied in California, 44.4 per cent were pubescent, as compared with 15.5 per cent found by Crampton for unselected boys, in New York. For gifted boys 13 years old, the proportion of pubescents was 71.4 per cent, as compared with 27 per cent of Crampton's cases. This is a very great difference in favor of early maturation for the gifted.

For girls, Terman obtained data showing that about 16 per cent of those who test above 140 IQ have menstruated before the twelfth birthday, as compared with 7 per cent of unselected girls, and that about 50 per cent of the gifted have menstruated before the thirteenth birthday, as compared with 25 per cent of the generality. The fact, therefore, is established that gifted girls also, as a group, attain puberty at an earlier median age than is the case with unselected girls.

The median age for the latter is about 13 years 6 months, in this country.

The reproductive life of the gifted thus begins earlier, on the average, than among unselected individuals. Whether it also lasts longer we do not yet know. Probably it does; for Kisch has collected a large amount of evidence to show that among women whose reproductive life continued to an unusually late age, a majority attained puberty earlier than the average. Kisch also shows that women of superior social-economic status are reproductive to a later age than others. Since there is a high positive correlation between social-economic status and intellect (as recent investigations have proved), there would follow, also, a positive correlation between intellect and length of the reproductive period of life.

VIII. HEALTH

Health denotes the functioning of the physical and mental organism. It results from the efficiency and harmony with which the various mechanisms perform their work and the degree of resistance to disease and of vitality which characterizes the individual. Contrary again to current belief, we find that nearly every aggregation of data on the subject shows gifted children to constitute an unusually healthy group.

We recall that Yoder's study of the great in childhood left him with the conclusion that they were at least as healthy as children commonly are. However, this proves nothing about the degree to which intellect and health are related, because of the fact that achievement almost certainly depends to some extent upon health. From studies of those who have lived to become eminent we cannot tell how many equally gifted may have succumbed in childhood for lack of vitality.

In 1915, Terman presented preliminary data to show that

children testing above 120 IQ were rated by teachers as being at least as healthy as the average. In 1924 and 1925, he stated his findings for California children testing above 140 IQ. The latter were examined by physicians, and were found to rate above "control" children in respect to health, on the whole.

There is little difference between gifted and control in frequency of colds and headaches. Somewhat more of the gifted have defective vision, but the control more often have defective hearing, symptoms of general weakness, and organic diseases. . . . The gifted are less often rated as nervous than are the control. The proportion of stuttering, chorea, excessive timidity, marked fears and tendency to worry is about the same in the two groups. Muscular twitching is slightly more common with the gifted. . . . Taking as a rough criterion typical data as reported in the literature of the school medical examining, these children (testing above 140 IQ) appear to be *above the average of children in general with respect to health.*

Sandwick has reported the relationship found between physical defects and mental ability in the case of 423 high school pupils. These pupils were tested by means of a group test. The forty highest and the forty lowest in the test scores were then compared with regard to number of physical defects previously listed on their individual health cards. The comparison yielded the following statistics:

	Forty with Highest Scores	Forty with Lowest Scores
Total number of physical defects . .	27	125
Average number of physical defects per student	0.71	3.41
Per cent having no defects listed . . .	52.5	0.00

The investigation adds something to the accumulating evidence that the child of good intellectual ability is also of good physical ability. In other words, it supports the view that the gifted child is not likely to be the physical and nervous wreck that some have supposed.

Results have been quoted here only from investigations where *test methods* have been used, and which conform to the requirements of scientific method. Studies which involve selection of the gifted by teachers' judgments, or by school marks, or which are based on physical examinations made without a control group, or by examiners who know the intellectual ratings of those examined, are of questionable validity. Unavoidable effects of bias and of illusion enter as constant errors into the judgments made under such uncontrolled conditions.

Before concluding our discussion of health, it is necessary to take note of the apparently plausible interpretation that an excellent score on an intelligence test may be merely a function of freedom from physical defect; that the very intelligent, as a group, are so *because* they enjoy good health. The falsity of this interpretation is readily suggested from two lines of evidence. In the first place, there is much overlapping between gifted and control groups in respect to all measurements of physique and appraisals of health that have ever been made. Some of the children in nearly every large group of the gifted are small and weak and in physical constitution, feeble. If intellectual superiority were a function of physical health, no frail children would be found among the gifted, and no dull children would be large, strong, and vigorous. The considerable amount of overlapping between the physical condition of the dull and of the gifted, which has been clearly set forth, proves in itself that superiority of mind and superiority of body do not *cause* each other.

An illustrative case, taken from the files of the present writer, will add point to the above generalization. A boy, eight years of age, was brought for mental tests because his teachers could not understand "how he could learn so much, when he could see so little." This child was so frail physically

that he had been under the constant care of a specialist from infancy. His vision was but one-twentieth of normal, due to congenital cataract. He was left-handed, moreover, and subject to disorders of metabolism. These physical defects and anomalies did not, however, prevent him from registering an IQ of 156 on tests of general intelligence. This IQ explained "how he could learn so much when he could see so little." If high scores on intelligence tests were *caused* by health and physical vigor, such a child would scarcely have been able to rate so high among the gifted. Every school psychologist of wide experience knows of similar, though perhaps not such extreme, negative instances, to prove that intellect is not *caused* by physique.

Another line of evidence comes through experiments made to observe whether or not the removal of physical defects exerts an effect upon the development of intelligence. The few experiments of this nature which have been carried through by thoroughly scientific method do not reveal any influence of improved health upon intelligence (except when the nervous tissue is directly involved). Adenoids and diseased tonsils, for example, were supposed at one time to affect intellectual development adversely. But the statistical and experimental studies recently carried out on New York City pupils, failed to demonstrate any casual connection between these physical defects and intelligence. Children whose adenoids and diseased tonsils were removed, did not improve intellectually during the subsequent year over the children of a control group, who did not have their similar defects remedied.

The fact that children of superior intellect are commonly (though not invariably) endowed with superior health also, does not, therefore, lead to the conclusion that all children would become mentally gifted if all their physical defects and diseases were corrected. Superiority of body accompanies, but does not *cause*, superiority of mind.

IX. STRENGTH

Strength may be measured by the amount of pull or grip that can be exerted by an individual against a machine counting in pounds or kilograms. Such a machine is the dynamometer. The grip of children testing above 135 IQ has been measured by Hollingworth and Taylor in this way.

Tabulation showing strength of grip, in kilograms, of three groups of children, 9–11 years old, age, race, and sex being constant in the three groups.

Kilos	Group A IQ above 135		Group B IQ 90–110		Group C IQ below 65	
	R	L	R	L	R	L
24–23	1	—	—	—	—	—
23–22	1	—	—	—	—	—
22–21	—	—	1	—	—	—
21–20	—	1	1	1	—	—
20–19	3	1	—	—	—	—
19–18	2	3	2	1	1	—
18–17	3	1	—	1	2	—
17–16	5	—	3	2	1	—
16–15	8	5	2	7	2	5
15–14	4	5	15	7	4	5
14–13	4	9	14	11	12	1
13–12	6	6	2	6	1	12
12–11	3	4	—	4	—	6
11–10	1	4	2	1	8	4
10– 9	—	2	—	—	9	1
9– 8	1	—	—	1	2	3
8– 7	—	—	—	—	—	—
7– 6	—	1	—	—	—	—
Total	42	42	42	42	42	42

Forty-two of the children measured by these investigators to determine size, were measured for grip in kilograms, and were then matched, as previously described, against forty-two children testing between 90 and 110 IQ, and below 65 IQ, respectively. Age, race, and sex were kept constant in

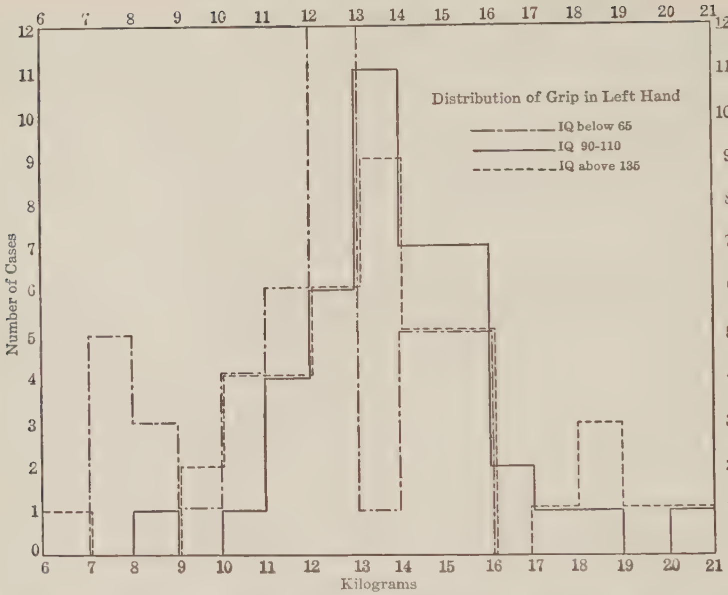

FIG. 17 (Part I). — Showing comparative distribution of left-hand grip, in kilograms, of three groups of children, 9 to 11 years old — age, sex, and race being constant in the three groups. (From "Size and Strength of Children Who Test above 135 IQ" by Hollingworth and Taylor. Reproduced, by courtesy of the National Society for *The Twenty-Third Yearbook*.)

all three groups. The results of the comparison are shown in Figure 17, with its accompanying table of frequency. These gifted children are as strong in the left hand and stronger in the right hand than average children and stronger in both hands than the stupid.

Garrison and Pullias measured boys and girls testing above 116 IQ, in the demonstration school of George Peabody College for Teachers, and found a positive relationship between strength of grip and intellect. "These results show definitely that superior mentality and superior physical development go along together."

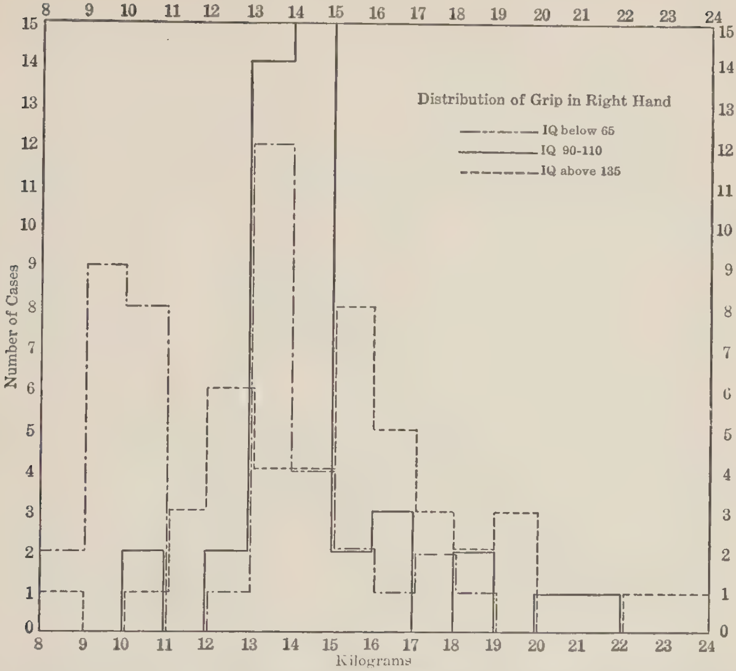

FIG. 17 (Part II). — Showing comparative distribution of right hand grip, in kilograms, of three groups of children, 9 to 11 years old — age, sex, and race being constant in the three groups. (From "Size and Strength of Children Who Test above 135 IQ" by Hollingworth and Taylor. Reproduced, by courtesy of The National Society for the Study of Education, from *The Twenty-Third Yearbook*.)

X. SPEED

In 1924, the gifted children measured by Hollingworth and Taylor for size and strength were measured also by one of these investigators for speed of voluntary movement. The measure used was the number of taps registered by means of an electric counter in thirty seconds. This test has often been used in child study to obtain an indication of motor capacity. Specifically, the trait measured is speed of voluntary movement with the hand, in one plane.

Each of fifty children testing from 135 to 190 IQ was tested for tapping, first with the right and then with the left hand. Thereafter each of them was matched with a child of the same sex, race, and age, from the regular grades of the same school, without regard to the intelligence of the latter. These "control children" then took the tapping test precisely as the gifted children had done.

The result of this comparison appears in Figure 18. The gifted are swifter, as a group, than are their schoolmates of the same sex, race, and age, chosen without regard to intellect. They move more quickly and effectively, both with right hand and with left hand.

Quantitative data showing motor ability of the gifted are very few. About twenty years ago psychologists studied the motor ability of children standing well in school, in comparison with that of children standing poorly in school, and found the former always either superior or equal to the latter. For reasons which have been repeatedly rehearsed here, such studies probably do not reveal in a valid manner the true relation between intellect and ability to move, because the selection was based on *achievement*. Educators need comparative studies of steadiness, of coördination, of endurance, and further studies of strength and speed.

The following conversation, between the principal of a school and the pupils in a special opportunity class for children testing above 150 IQ, shows how these facts of physique and movement which have been presented become concrete in the daily life of the school. The conversation was transcribed on the occasion of a casual visit to the school.

PRINCIPAL [*addressing class of children, 9 to 11 years of age, with median IQ of 164*]. In regard to a field day, will the opportunity classes have the same field day as the pupils of 6B and 7A? Or do they want to take a Saturday by themselves, and compete against each other?

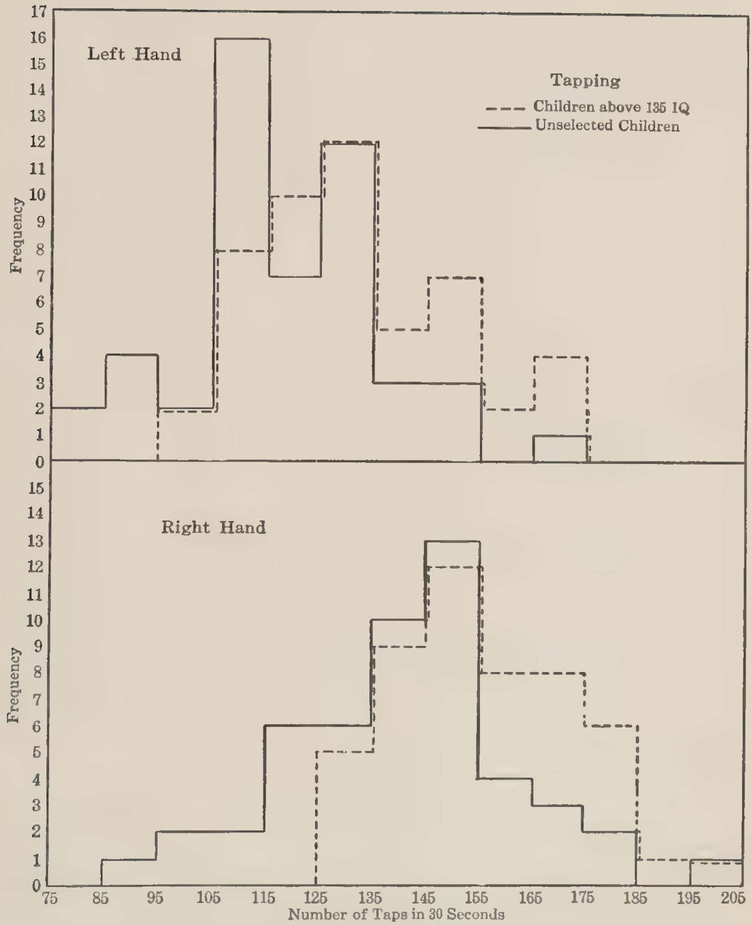

FIG. 18. — Showing how very gifted children tap, in comparison with children of the same race, age, and sex, but unselected as regards intellect. (From "Tapping Rate of Children Who Test above 135 IQ" by Hollingworth and Monahan. Reproduced by courtesy of the *Journal of Educational Psychology*.)

Child A [*boy, 10 years old, IQ 175*]. I think we'd like a field day by ourselves.

Class [*nodding*]. Yes! Yes!

Principal. Why is that? Why do you prefer a separate field day?

Child A. Because we can't compete fairly with the children in 6B and 7A. We've tried playing against them, and they are all twelve years old at the very least. They can beat most of us.

Child B (*boy, 9 years old, IQ 168*]. Yes, that is true. They are bigger than we are. Most of them are thirteen years old.

Child C [*girl, 10 years old, IQ 173*]. But, Mr. ——, the other opportunity class doesn't want to compete against *us*, either. (*Referring to the other special class, containing children who have a median IQ of about 143 but are of the same age.*)

Principal. Why is that? Aren't the children in that class as old as you?

Child D [*boy, 10 years old, IQ 156*]. Yes, sir, they are the same age as we are, but we seem to always beat them. They say they can't win from us.

Principal. Well, think it over. Perhaps we can arrange two field days, one to compete with 6B and 7A, and the other for competitions in the opportunity classes.

It should be added that the three or four largest, strongest, and swiftest children were all in the group being addressed (above 150 IQ), and that these could win over the best in the other special group, though there was very little difference in medians between the two groups.

XI. PERFORMANCES INVOLVING BODY WEIGHT

Since the gifted are heavier as a group than children of ordinary intelligence, it is of interest to know how well they carry their body weight in tests of neuromuscular capacity. In 1925, Monahan and Hollingworth tested the gifted children already described, at Public School 165, Manhattan, in the standing broad jump and in chinning. Each gifted child was paired with a schoolmate of ordinary intellectual per-

formance, from the regular classes of the school. Each pair was matched for sex and age, and conditions of testing were kept constant for both members of each pair. Weight and grip were also taken for each child participating.

In the following tabulation of results it appears that the gifted barely equal the ungifted in jumping, and that they are inferior in ability to chin themselves on the horizontal bar. They are, however, superior in strength of grip, as already proved in previous investigations. They carry, on the average, a surplus of about 7 pounds of body weight, as compared with their experimental competitors.

Tabulation of data, showing means, mean deviations, and probable errors of the differences between means, in age, weight, and motor performances for gifted children and experimental competitors.

	Experimental Group		Control Group		P.E.d
	Mean	M.D.	Mean	M.D.	
Age in mos.	135.2	6.20	135.1	6.40	1.13
Grip (kilos)	25.0	3.29	23.4	3.56	.48
Broad jump (in.)	58.66	5.72	58.84	7.44	1.11
Chinning	.98	1.12	1.67	1.72	.27
Weight (lbs.)	88.10	13.86	81.24	11.15	2.18
Jump × Wt.	426.0	57.53	399.0	70.33	11.68

The gifted, therefore, carry their heavier bodies as far as the ungifted carry theirs, in jumping; but in raising the body by the arms to chin themselves, they do not equal their ungifted rivals. The difference in results of these two performances may possibly be due to the fact that in jumping the superior height of the gifted is helpful, whereas in chinning height is not an aid. In the latter test, the task falls upon the muscles of the arms, which must lift the sheer body weight vertically. At the ages studied, the superior neuromuscular energy of the gifted, shown in gripping and in tapping, is not

sufficient for superior performance where their greater body weight must be raised.

SUMMARY AND IMPLICATIONS

We may summarize present data about the physique of intellectually gifted children by saying that they tend to be tall and heavy, and to maintain a high ratio between weight and height. In so far as this weight-height ratio indicates nutrition, they are very well nourished as a group. However, it must not be forgotten that there are a few small, thin children among them.

Cranial measurements show their heads to be larger than those of unselected children, but in proportion to the physique as a whole.

As regards movement, we have few precise data, but such as we have show the gifted to be stronger and swifter than unselected children, as a group. To illustrate this characteristic superiority of motor control, Figure 19 shows an infant of eleven months balancing balls on hands and feet as he lies in his crib. At that age, this was a favorite amusement of this infant. At six years of age this boy tested at 187 IQ and has maintained this record on annual tests made during the subsequent five years.

Although children of superior intelligence are, in fact, usually superior in motor ability as well, except in tasks where body weight must be raised, teachers often rate them as "below average" in this respect. It is said that they are deficient in penmanship, cannot manage wraps, cannot keep up with the work assigned in manual training, and are a nuisance in athletic games. Thus a teacher complained of a six-year-old of IQ above 180, graded with eight and nine-year-olds, that he was "inferior to the average child of his age in penmanship" — forgetting, no doubt, that the average child of six years

FIG. 19. — Showing superior motor control of an eleven-months-old infant, later testing at 187 IQ.

has developed no penmanship to serve as a basis of comparison.

Such erroneous ratings arise from an illusion, which is due to the fact that the bright are usually young for the classes to which they attain, and are thus compared with older children in motor performances. Since coördination, speed, and strength in movement depend much more closely upon physical development than they do upon mental status, the young child appears awkward among his less gifted, but physically more mature, classmates. A six-year-old who scores in the top quarter of six-year-olds, will nevertheless rate low among eight-year-olds or nine-year-olds in penmanship, manual arts, or athletic games. Teachers, not keeping in mind the factor of birthday age, are thus subject to the illusion that the young child of great intellectual promise is deficient in motor ability.

Similarly, educators have to guard against the illusion that the gifted child is small. The gifted child is usually *small for his grade*, but he is usually *large for his age*. To illustrate this illusion, we may cite the remarks of an exceptionally competent principal, upon being told that gifted children are usually large: "That can't be so! Why, nearly all of the brightest boys in our high school are little fellows, many of them in knee breeches."

Measurements show that ten-year-olds, who are five years beyond the norms in mental age (who are of IQ 150) are able to perform the intellectual work of fifteen-year-olds. But they are on the average only as large as unselected children of eleven and one-half years and are only as strong and as swift as eleven-and-one-half-year-olds. There is thus a great discrepancy between amount of deviation in intellect and scholastic possibilities on the one hand, and in size and motor ability, on the other. A child of IQ 150 can adequately umpire a tennis match many years before he can adequately

play in a match. He can be a thoroughly competent umpire at ten years of age, but he cannot use ball and racket competently until he is much older.

These facts obviously have direct implications for pedagogy. If graded with much older pupils, whom they equal intellectually, children above 130 IQ will be well "out of their depth" as regards physique and movement. At ten years of age most of them may be advanced one year, and many of them two years, beyond the age-grade norms, without showing a deficit either in size or in movement in comparison with their classmates. This amount of advancement will not, however, take care of their intellectual needs, since they will be three or more years beyond the average child in capacity to assimilate ideas.

The alternatives of rational policy are, therefore, either to compromise between intellect and physique in grading, or to segregate the very gifted (where population is dense) in special classes, so that appropriate provision may be made for the exercise of all capacities, without the necessity of compromise.

Some of these results of quantitative investigation have long been vaguely apparent. It is a fact of general observation *that the gifted know more than they can do*, and that this discrepancy may lead under unwise guidance to tension. The particular value of precise measurement is that it reveals the *amount* of the discrepancy and dispels, at the same time, the widespread illusion that bright children are particularly small and awkward, and in manual skill, "inferior."

Finally, the question arises as to whether the gifted maintain their physical superiority throughout the period of development and at maturity. This question cannot be answered until the young gifted children who have been repeatedly measured have completed their growth. Very probably they will maintain their superiority at all ages, for Baldwin has

found in remeasuring children (of untested intelligence) from six to sixteen years of age inclusive, that those tall at any age usually remain tall throughout the period of growth and at maturity. It will therefore probably be found that the greater size of gifted children is not merely a matter of more rapid growth toward an ordinary maturity level. The likelihood is that these large children will be large men and women, when they are mature.

The question of the comparative vigor throughout life and of the comparative longevity of the gifted cannot be answered, until groups of children who have now been tested have all lived out their life spans. Investigators now living can hardly hope to know the complete answer to these questions.

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CHAPTER V

Character, Temperament, and Interests

I. WHAT IS CHARACTER?

Intellectual capacities represent, of course, but one aspect of mental life. There are other psychological traits, including the dynamic and emotional phases of personality, which are of crucial importance in the appraisal of a human being. These traits are often designated *temperamental*, to distinguish them from the intellectual capacities. Temperament and intellect together, reacting and interacting in response to environmental stimuli, result in habits which we call *character*.

In the long, gradual process of biological evolution, those persons survived generation after generation in whom there was innate readiness to form certain habits rather than others. The innate tendencies thus selected for survival (sometimes called instincts) were suited to keep individuals alive in the dangers of the wilderness in which men have nearly always lived. It is but recently that man has led the protected life of modern civilization. Agriculture itself appeared in Europe only about five thousand years ago. During the uncounted centuries preceding those first great triumphs of intellect over the wild earth — discovery of the seed, the innovation of planting, domestication of animals, the invention of artificial shelters — only human beings could survive, both in their own persons and through offspring, who had innate tendencies to form self-protective habits of reaction. It has been, therefore, an unavoidable product of biological evolution that the

typical person of our day, if left uneducated, strongly tends to form "selfish" habits of aggression, of display, of acquisition, of ownership, of fighting, of resentment at mastery, of fear, of hunting, and so forth. Modern education, both formal and informal, is a lifelong process of forming and maintaining habits of action which ultimately win security for the civilized group but which are contrary to those most readily formed by the individual in a "state of nature." Mankind, seeking security, has come, through the leadership of its intellectually gifted members, to a state of civilization such as we witness at the present time. Under these conditions of living, provided by the researches of the intellect, many of our strong, dynamic tendencies to savage, selfish habits have become unsuitable, though they were very suitable to the encounters of the wilderness in which our remote ancestors survived.

An individual's temperament is the particular combination of amounts of all those instinctive tendencies to action which have been inherited from persons who could live through primitive hardship to produce him. Under education, every child strives with varying degrees of effort, according to the rewards and punishments met, to adapt these tendencies, in overt action, to the requirements of civilization. The set of habits thus finally formed is known as *character.*

Certainly the significance of any individual life depends largely upon character. Character is a particularly important attribute in the social evaluation of an intellectually gifted person. Such a one, who is disposed to use his intelligence to further, rather than to readjust, his selfish drives, can be a much more dangerous enemy to the security of all than one less able to plan and invent. It was said in discussing the definition of intellect that intelligence learns how to get and how to do *what is wanted.* What is wanted will be determined by character and the attitudes originating in character.

Character decides *what desires* will secure the services of intellect. It is thus of special interest to make observations upon the temperament and character of intellectually gifted children, to see how they are disposed.

II. METHODS OF RATING CHARACTER

In making calculations of the relationship between intellect and character, we are at present handicapped by the lack of a scientific method of rating character. Traits like honesty, punctuality, humor, liberality, pertinacity, cannot now be objectively classified, as intelligence can be. There have been a few valuable suggestions for the construction of tests of temperament and character, but none of them has been developed to a point of general practicability. With regard to the determination of temperamental quality in a given person, we are now about at the point where psychologists were thirty years ago with regard to the determination of intellect. We have to depend chiefly upon the unstandardized estimates of associates, which we know to be highly fallible.

It will be recalled, however, that in discussing the fallibility of teachers' judgments it was stated that if a number of independent opinions be rendered and combined, the combination approaches the impersonal, and attains a considerable degree of reliability. Thus if a child be rated for honesty by various persons who know him, the mean result of such ratings tends to be accurate, that is, useful for prediction.

The character of gifted children has been studied by the methods of estimate, in several independent investigations. Terman's researches are here again the most intensive. Contributions have also been made by Root, Johnson, Coy, Davis, and others. The results of these independent investigators agree very closely, which is in favor of their correctness.

Before summarizing these studies, however, we may con-

sider briefly the few attempts which have been made to classify gifted children by means of character tests.

III. TESTS OF CHARACTER

Various attempts have been made to study the gifted by means of the Downey Will-Temperament test, and by other tentative methods of testing non-intellectual endowment. Only a few of these attempts have yielded results capable of statistical interpretation. This is, of course, not surprising in view of the present condition of the technique.

In an overstatement test (Raubenheimer-Ruch), in which statements to the effect that one knows are later checked by requiring that one tell, the gifted children studied in California by Terman ranked consistently a little higher than unselected children of a control group. They were less likely to say they knew, when they did not. In a test of questionable interests (Raubenheimer), relating to the titles of books, the results showed 74 per cent of the gifted above the median of the controls in wholesomeness of choice. In a similar test, relating to choice of companions by description given (Raubenheimer), 81.3 per cent of the gifted ranked above the median of the control children. In a test of social attitudes (Raubenheimer), in which a choice is made among various possible points of view regarding stated persons or things, the results showed 90.1 per cent of the gifted above the median of the controls, for socially approved attitude.

In the case of these same children, an attempt was made, also, to test conscientiousness (Voelker-Cady) by setting a task to be done with eyes closed, in which, however, there is very little chance of success without peeping. The results showed the gifted far above the control children at all ages, in trustworthiness.

IV. RATINGS BY TEACHERS

In 1915, Terman secured teachers' ratings on 31 children testing at or above 125 IQ (in the best two per cent of children) for the following traits of character: studiousness, social adaptability, leadership, vanity, popularity, and moral conformity. Of the 31 children, 15 were rated as extremely studious, 11 as usually studious, 5 as not particularly studious, none as lazy; 25 as socially adaptable, 4 as doubtful, 2 as socially unadaptable; 14 as leaders, 12 as not particularly conspicuous in leadership, 5 as doubtful; 22 as not spoiled or vain, 2 as "a little vain," 5 as vain, and 2 as unestimated; 26 as "popular," "liked by everybody," 1 as not liked, 1 as inspiring repugnance, 3 as of doubtful popularity. Regarding moral faults, 19 were reported to be without such faults, 8 as showing one or more faults, with "no answer" in 4 cases. Of the 8 mentioned as faulty, 2 were described as "very self-willed," 1 as in need of "very close watching," as "cruel to animals," 1 as "untruthful," 1 as "unreliable," 1 as "a bluffer," and 1 as "sexually abnormal and vicious."

This preliminary study suggested, therefore, that children constituting the best two per cent of the juvenile population intellectually are studious, socially adaptable, popular, and modest in demeanor, as a group, and that serious defects of character are few among them. Only one of these 31 children could be said to be a serious moral problem.

Later, Terman communicated teachers' ratings on 50 California children testing at or above 135 IQ. The teachers were asked to make their estimates in five degrees, a grade of 3 representing their idea of average in the trait rated, 1 being the highest possible rating, and 5 the lowest. The mean ratings thus assigned to the group of the gifted were as shown in the following list:

Sustained attention	1.44	Unselfishness	1.73
Will power	1.50	Sense of humor	1.80
Persistence	1.51	Evenness of temper	1.90
Dependability	1.56	Intellectual modesty	1.90
Studiousness	1.58	Emotional self-control	1.94
Cheerfulness	1.61	Physical self-control	1.94
Obedience	1.61	Initiative	2.06
Conscientiousness	1.61	Social adaptability	2.24
Courage	1.62	Leadership	2.41

This group of gifted children was, therefore, rated as above average in every one of these desirable traits of character. In several traits a few children were rated below 3 (below average), but the majority were rated above average, as appears from the fact that the means all fall above 3. In "deportment," the mean school rating of the group was very superior.

In order to supplement these data, Terman further questioned the teachers, as follows: "Describe any moral faults or peculiarities, such as disobedience, obstinacy, dishonesty, selfishness, inability to get on with others, unusual or abnormal sex interests, lack of balance, etc."

In reply to this request, data were secured for 53 children, of whom 46 were said to have no moral faults or peculiarities worth mentioning. The remaining 7 were said to show the following faults: "pleasure in others' mistakes," a "rather bad disposition," obstinacy, lack of will, "a great interest" in the opposite sex, shyness, and overreadiness to cry. These faults were attributed to but one child each. In addition, one other child appeared as a really serious moral problem. This was a boy of IQ near 150, who was "spoiled and vain, and looked upon with a certain amount of distrust." He was described as stubborn and wilful, a bully among younger children, and abnormal in sex interests. He had once attacked a small boy with a knife. Such cases as this show that high intelligence may be combined with vicious temperament, although such a combination is apparently very rare.

Still later, in 1924, Terman reported the result of rating traits for the 643 children testing above 140 IQ, located in the California survey.

> Both on parent and teacher ratings the gifted excel the control at all ages in mean ratings on most of the traits, especially in "general intelligence," "desire to know," "originality," "will power," "perseverance," "desire to excel," "sense of humor," and "common sense." Gifted girls are rated higher than gifted boys on a majority of the traits, and their ratings more often improve with age. The control girls, on the other hand, are not rated significantly higher than control boys. Parents and teachers agree closely with respect to the traits which are rated highest and lowest (rank order correlation, .75).

In 1923, Johnson published teachers' ratings of the character traits of their intellectually best pupils (as determined by mental tests). These results comprise the judgments of 31 teachers concerning 41 special classes for superior pupils in St. Paul. The majority of the pupils were in high school. Seventeen traits of character were evaluated. The results show what impression intellectually superior pupils make on teachers. In each case the teacher indicated whether the class, as a whole, showed more of the given quality than a class composed of average pupils.

In the replies there was complete agreement upon the following points: that the pupils selected by test are more alike in ability than in unselected classes; that they are mentally more alert; and that they are better able to grasp new ideas. These three judgments relate primarily to intellectual traits. In regard to the following there was almost complete agreement: that the pupils selected as "bright" are more inquisitive than average pupils; that they are more imaginative; more courteous; have a keener sense of humor; and that they are more coöperative. The majority of teachers also judged that these children are more willing to take suggestions, are more talkative, express opinions more readily, are not more domineering than average pupils, nor more self-willed (although a few

teachers suggested that they show tendencies to self-will). Neither are bright pupils egoistic, according to these combined judgments, and they are not, as a rule, easily discouraged. The judgments were in disagreement as to whether the bright are "high-strung," and "easily bored by details." In this case we do not know how many of the pupils studied would conform to our definition of "gifted," that is, would rank in the highest one per cent for intellect by individual test, for this is not stated. We only know that they were selected by test as "superior." The general trend of teachers' opinions regarding them is the same as in the case of the California teachers: *Children selected wholly by intelligence tests, without consideration of other factors, show desirable traits of character and temperament, in superior degree.*

In answering the question, "In what respects is your class strong?" teachers of these special groups in St. Paul gave typical replies. "Strong in original or unusual work." "Interested in any subject." "Pupils show self-confidence and pure delight in work." "Strong in initiative, making suggestions and carrying on." "Eager, ambitious, interested, and very willing." "Strong in going ahead and working by themselves." "Strong in willingness to accept criticism." "They enjoy mastering difficulties."

Replying to the question, "In what respect is your class weak?" the same teachers replied that some gifted children have not learned to work up to their capacities and that they are somewhat careless in respect to details. This leads to weakness in the mechanics of spelling, punctuation, and calculation, if not overcome.

Davis in 1924 made a report, without statistical computations, however, on results of a questionnaire returned by 62 teachers and supervisors in 18 states. These teachers stressed social popularity and leadership as characteristic of the intel-

lectually superior, enumerating as conspicuous traits, "an interest in people," "skill in managing people," "a high degree of leadership." They emphasized also, "power of sustained attention," "tenacity of purpose," "intellectual curiosity," "initiative," "tolerance," "impersonal attitude," "self-criticism," "sense of humor," and "imagination." The faults most frequently mentioned were "indolence," and "inaccuracy," especially in children who had been working below their capacity in the regular grades.

Root published in 1921 a study including estimates of the character of gifted children. His conclusion is that they are, as a group, "conformists." This is, perhaps, a somewhat different way of saying what others have said about their moral adaptability and integrity. They rarely become juvenile offenders.

Does this mean that the intellectually gifted are merely docile and subservient? Such an interpretation scarcely squares with the estimates made of their tenacity of purpose, their originality, and their powers of initiative. It seems probable that their moral conformity arises largely through the exercise of their superior intelligence. They quickly learn that "it pays" in emotional tranquillity, personal security, and sense of duty done, to regard the attitudes of others, and to meet responsibility fully and promptly regardless of inclinations. At the same time, their intelligence enables them to perceive what the attitudes of others are, and how to discharge their responsibilities competently.

In addition to the ratings of teachers made as already described, Patrick has studied ratings made on scales of citizenship, standardized by Chassell and Upton. These scales list various traits of character, which contribute to good citizenship, and the rating achieved thereon by the average child is known. The children in this investigation were chiefly above

130 IQ. They were rated by their teachers, and they also rated themselves. It is of interest that, though teachers rated the gifted much above average children, the gifted children rated themselves only slightly above the range which unselected children apply to themselves. All the teachers rated the children higher for good citizenship than the children rated themselves.

V. RATINGS BY PARENTS

It might be supposed that parents would show a large constant error of overestimation in their judgments of the character of their children. This is, however, not true of the parents of gifted children. It has been shown repeatedly that very gifted children are usually underestimated by their parents. The more gifted the child, the greater the degree of underestimation. This constant error on the part of these parents is due to influences well known to the psychological laboratory.[1] They mistake their own standard of conduct for "average," and judge their children on that basis. Since the parents of gifted children are very superior in standards of conduct, as a group, they underestimate their children, rating as but "average" that which is in reality very far above the average for the population as a whole.

Terman had his second group of 59 children, which was judged by teachers, judged independently by parents, also, with the result that parents gave lower estimates than teachers on every trait, except unselfishness. In unselfishness parents gave a higher rating than teachers, though both gave a mean above 2. As regards the order in which superiority of characteristics is most marked, teachers and parents agree closely.

In the case histories of gifted children, it often appears that parents are surprised to learn of the selection of their child for

[1] Hollingworth, H. L.—"The Central Tendency of Judgment": *Journal of Philosophy, Psychology, and Scientific Methods*, 1910.

a special class, or to hear that they have offspring superior to the average. "Why, he (or she) seems just about like the rest of the family!" is their astonished comment. In such instances, it is usually quite true that the child resembles the rest of the family. What has not been considered is the fact that "the rest of the family" are superior people, who have a very erroneous idea of what "the average" of the general population is like.

The judgments of parents do, nevertheless, when many are combined, rate their gifted children in traits of personality, above even their own too high idea of average. They give a mean rating of near 2 (3 representing their idea of "average"). This reflects the fact, to be considered in a later chapter, that a very gifted child is likely to be the best one of a superior family group. The more gifted the child, the more likely he is to be the best one among his relatives. Their judgments, combined into an impersonal result, reflect this natural law.

The fact to be remembered then is that, though parents rate their gifted children high, they do not rate them *high enough*, as shown by tests and as suggested by the judgments of teachers, who have a better opportunity to know children in variety. Under the influence of the same psychological factors, there is little doubt but that parents of dull children would *overestimate* their offspring, since their idea of "average" would probably be much too low. It would be worth while to collect statistics of the ratings given to dull children by their parents. Apparently this has never been done.

VI. NERVOUS STABILITY

By nervous stability is meant *the power which an individual has of acting contrary to his native impulses without loss of self control.* This power is present in varying degrees in members of our species. Since there has never been devised as yet a

method of gauging it quantitatively, we cannot state the form or range of its distribution. We can only predict from common observation of individual differences in behavior, that tests will ultimately show the range of stability to be very wide. The extent to which disagreeable action, with poise, is possible to a given human being is apparently a matter of original constitution. Together with intelligence, this qualification seems chiefly to determine what grade of character will be formed in a given environment.

Concrete categories of action, involving "strength of character," are "holding the temper," approaching what is feared, speaking well of successful rivals, abstaining from food when hungry. All inhibitory acts and habits, of which these are examples, violate innate tendencies, and require for their constant practice, without lapse or breakdown, a high degree of nervous stability. Children who are constitutionally poor in this respect reveal their instability by extreme irrational timidity, unusual fears, rages, and other outbursts of emotion, when thwarted in carrying out impulses. An exhaustive discussion of these symptoms is not possible here, but they are recognized, and are described in the special literature of pathological psychology.

During the World War, these symptoms were formulated into a questionnaire, designed by Woodworth, to detect the nervously unstable among recruits. In a revision of Woodworth's questionnaire, adapted to school children by Cady, 75 per cent of Terman's group of 643 gifted children made scores superior to the median score of a control group. The intellectually gifted showed far fewer symptoms of nervous instability than were found among unselected children, by this method.

In agreement with this finding are the opinions of teachers and of parents, who rate the majority of gifted children above average in stability. The value of ratings in this respect is,

of course, greatly impaired by the lack of a common understanding as to what constitutes nervous instability. For instance, one child was rated as "nervously unstable and eccentric" because he "used big words," and wanted always to be "doing something different." This child, of IQ above 180, of course did not care for the pursuits of his classmates of equal age, and this divergence was considered by his teachers to constitute "nervous instability." The fact is that this child is unusually stable for his age in control of his impulses and emotions.

This tendency to identify any divergence whatever from expected conduct as "nervous instability" is but one of many sources of error in the judgment of temperament. Another prolific source is here, again, the constant comparison with older children. As children develop toward adulthood they gradually mature in emotional control, just as they do in intellectual ability. The median child of twelve years does not, for instance, cry as readily in response to the same grievance as does the median six-year-old. The degree of emotional control does not, however, necessarily run parallel to the degree of intellectual ability in a given child, so that the "emotional age" of an individual may vary widely from his "intellectual age."

This being the case, a child of IQ 180, for example, will often seem "queer," solely from manifestations due to his superior intellect. If graded in school with much older children, he will seem peculiar to them when he jumps up and down, clapping his hands with glee over some situation, in which they have learned to restrain emotion. Emotional behavior, which would seem entirely appropriate in a group of eight-year-olds, seems odd in an eight-year-old seated among eleven-year-olds. The "oddness" arises, however, not from inferior emotional stability, but from the superior intellect which puts

the child so far ahead of his age as regards classmates. The case is precisely analogous to that in connection with motor control. Intellectual age in the very gifted runs above all other phases of development and, by leading to association with much older children, creates in the minds of observers the illusion that the former are inferior in these other phases, whereas the majority of them really are above the average in all or nearly all respects.

Again, it is to be considered that the intellectual acuity of a young, very gifted child leads him to give emotional response to stimuli, which would be met with complete indifference by the average child of his years. To illustrate, the parents of a six-year-old boy, of IQ 187, heard him weeping one evening after he had been put to bed. When they asked the cause of his grief, he said, "I was crying to think how awfully the North taxed the South after the Civil War." At the age of six years, grief is usually aroused only by very concrete, immediate situations, such as the loss of a toy, refusal of the parent to bring a drink, or deprivation of company, and the like. But in this child we have grief for the violation of an abstract principle, in a situation remote from experience, touching upon people existing only as ideas in the child's mind. Such grief is unusual, even among adults; but it is not a manifestation of nervous instability. It results primarily from uncommon insight or intelligence. The very intelligent seldom weep at what moves the average person, but they weep when the average person perceives nothing to call forth tears.

We have said that there are marked discrepancies among gifted children, between "intellectual age" on the one hand, and "physical age," "motor age," and "emotional age," on the other. Is there a danger that these discrepancies may of themselves bring about strains tending to unbalance the child and to produce what might properly be called "nervousness"?

The young child of IQ above 130 comprehends situations which the ordinary child of his age is "too young to understand," and his volatile emotions of a child are provoked by these situations. Yet he is too small and helpless to right the wrong he sees, to bear the responsibility for which he is ambitious, or to command the respect which his opinions deserve. He *knows* so much more than he can *do*, that wide discrepancies between desire and attainment must necessarily arise. Such discrepancies are a source of tension among persons generally. He whose grasp chronically exceeds his reach is always under strain. Gifted children appear, however, to be of a stamina that resists tension. Perhaps they are balanced, too, by the many ways in which they can excel in *doing*, and by the fact that they so rapidly grow up in other respects to a point where the whole organism becomes a competent servant of the intellect. Perhaps their intellect enables them to adopt the philosophical point of view to an unusual degree. At all events, they are as a group less "nervous" than unselected children, by all criteria at present established.

Nevertheless, the fact that a nervous system resists strain well, is not a reason for putting strain upon it. The wise home and the wise school will understand the existence of the discrepancies which have been described, during the years of immaturity, and will not thoughtlessly involve the child in situations which arouse a helpless resentment that may lead to cynicism. The wise parent will avoid talk of "causes," either personal or impersonal, which the child has no power to help. The wise teacher will not place the child in physical competitions where he has no chance to make a respectable score.

Finally, it may be well to point out that investigators do not find a complete absence of the nervously unstable in large groups of gifted children. Nervous instability and superior

intelligence are by no means totally incompatible; their incompatibility is but relative. The consensus of investigators' opinions is that there are *fewer* nervous children among the gifted than among unselected children — not that there are no gifted children who are nervous.

VII. LEADERSHIP

The ability to attract and persuade people and to organize them, together with an interest in doing so, qualifies an individual for leadership. What part does intellect play in this complex of personal equipment? Observation of the fact that extremely intelligent individuals are not necessarily leaders of their fellows, has led to the speculative statement that there is a "social intelligence," which is independent of the intelligence measured at present in terms of IQ, the latter for the sake of distinction being called "abstract intelligence" by those seeking to establish the concept of "social intelligence."

It is highly improbable that any different "kinds" of intelligence will ever be demonstrated to exist. What has been termed "social intelligence" is no doubt merely a certain fortunate *combination* of temperamental and physical traits, with an optimum amount of intelligence. What is here meant by "an optimum amount of intelligence" will immediately be explained.

In observing who are the popular leaders in various groups of children, it appears to the present writer that the intelligence of the leader is related in a fairly predictable manner, other traits being favorable, to the intelligence of the led. Among children with a mean IQ of 100, the IQ of the leader is likely to fall between 115 and 130 IQ. That is, the leader is likely to be more intelligent, *but not too much more intelligent*, than the average of the group led. If there is in an ordinary group of children a child of about their own mean age, relatively large,

handsome, amiable, courageous, generous, and strong, and of IQ between 115 and 130, such a child is likely to be a leader (due regard being had to social attitudes governing leadership as related to sex). Above 130 IQ, however, the chances of leadership among a group such as described, appear to decrease till, beyond IQ of 160, a child has very little chance of being a popular leader. In a group with a mean IQ at 130, however, a child of IQ as high as 160 may well lead, for such a group gives allegiance to a degree of insight above that which wins the average group, other traits being favorable.

These remarks will be clarified by a concrete illustration, taken from among public school children of New York City. A nine-year-old boy of IQ 190, whom we may call J., was found in the fifth grade of a public school. He had been in that school since arriving at school age and had never exercised any form of popular leadership at any time. On the contrary, attention had been called to his case because he lived in practical isolation from the play life of the school. He had never been elected to any office in his classes during his school career. After mental examination this boy was removed to a special opportunity class, where the mean IQ of the group was 164. Before the remainder of that school year had elapsed, he was elected first to be editor of the class paper and then to be classroom monitor; the former, "because J. knows so much"; the latter, "because J. will make us behave." During the second year, J. was elected captain to lead in various contests of skill against other classes. The following verbatim conversation, which took place in the classroom just before a spelling match, shows very concretely how an IQ of 190 may attain leadership when the mean IQ of the group is 164.

Teacher. Now it is time to choose those who will represent us at the spelling match to-morrow. How will you choose?

CHILD A [*IQ 175*]. Miss S., I nominate J. If he is the best speller among us, as I think he is, let him be captain.

OTHER CHILDREN [*IQ's 150 to 175. Nodding*]. Yes. Let J. be captain.

TEACHER. All right, then, you will have J. for captain. There are nine others to choose. How shall we choose them?

CHILD B [*IQ 167*]. I should think we would let the captain choose. He knows who our best spellers are.

OTHER CHILDREN [*nodding*]. Yes, let the captain appoint.

CHILD C [*IQ 170*]. No, I think Miss B. [*who had given many tests in spelling*] knows better than J. who are our best spellers. She should tell us.

OTHER CHILDREN [*dissenting*]. Miss B. isn't here. It is best to let J. choose.

TEACHER. How many vote to let the captain choose? Very well. It is decided then. Will you choose, J.?

CHILD J. Yes. I will have the list made out by tomorrow morning.

To one who has repeatedly observed such incidents it seems clear that such leadership as J. now exercises is founded largely on the IQ's of his group. Among his former classmates, or among others like them, he would doubtless be retired to his former isolation and obscurity. In one group he has "social intelligence"; in the other, he lacks it.

The reasons for this are, of course, many. In the first place, median nine-and-ten-year-olds do not understand many of the words J. uses. His vocabulary is so far beyond theirs that he speaks almost a different language. Words like "naïvety," "reciprocal," "capitulate," which he uses because they express exact meanings, convey nothing to them, except that J. is "queer." They are not interested in the subjects of conversation which he introduces, and he, in turn, is not interested in tag, mumble-the-peg, and the other uncomplicated games they like. J. is far beyond the optimum degree of intellect for leadership in such a group. It is apparently a fact of social psychology that a group does not seek of its own accord to fol

low one who is too intelligent to be well understood by its members, and that the individual, in turn, does not seek leadership in groups more than a certain number of degrees below him intellectually.

We have called attention to the great importance of personal appearance in leadership, and to the fact that studies of executives in business reveal that the majority of men in such positions are large. Physical size is, no doubt, in itself a determinant of leadership, apart from its correlation with intelligence. The fact that very gifted children are usually youngest in their classes also tends, therefore, to reduce their chances for leadership, for they are thus smaller than the average of their classmates. Boys in long trousers are averse to being led by a boy in short trousers, so that the latter starts with a heavy handicap requiring much to offset it.

In spite of all these conditions which reduce the correlation between intelligence and leadership, especially among children, investigators report a greater number of popular leaders than chance would provide, among gifted children. Those testing above 140 IQ are reported to be leaders as well as those testing from 120 to 140 IQ. The leadership of those higher in IQ is probably in many cases based on groups which are selected, with a mean IQ well above 100. Schools in excellent residential sections, where children testing above 140 IQ are most likely to be found, have a mean IQ for all pupils above 100. In private schools, where the mean IQ is usually nearer 120 than 100, children above 140 IQ are leaders. Thus the present writer knows of one child of IQ above 180, notably endowed with physique and temperament favorable to leadership, who was described by teachers as an organizer of other children. The mean IQ of the group led by this child was, however, 125, with several in it testing above 140.

These phenomena of leadership have been little studied,

though they are of importance for the theory of democracy. The theory of democratic society assumes that the group will choose the best intelligence to lead it. In so far as this is not actually borne out in practice, the group becomes involved in errors and miseries, which could have been avoided under the leadership of the most intelligent (assuming the latter to be interested in humane leadership).

We have been speaking here throughout of popular leadership, that is, the leadership which comes of being formally or informally elected by one's group to organize or guide in group enterprise. We are not speaking of intellectual leadership, as in learning, which is not popular, the contemporary adult population not even knowing, usually, who the intellectual leaders are.

VIII. INTEREST IN PLAY

Yoder found that the great men whom he studied had been much interested in play during childhood, though often the play was of a solitary kind or otherwise extraordinary. It is highly probable that all the fifty persons studied by Yoder were in that range of the distribution for intellect represented by "above 170 IQ." Children so very gifted intellectually as to rate above 170 IQ often show play interests which are uncommon for their years. Gifted children rating far below this very exceptional level, from 130 to 145 IQ, are reported by parents and teachers to show the usual play interests, and the reports made by such children themselves reveal no deviation in play so wide as to be very noticeable to an untrained observer. Generally speaking, a child whose play is conspicuously different from that of others of his age diverges very far from average intellectually.

One reason why the play interests of moderately gifted children do not seem unusual is that they seek and are accepted

by playmates who are older than themselves. Reports have shown repeatedly that children tend to play with others *of like mental age.* Thus the ten-year-old, whose chums are from twelve to thirteen years of age, enters with interest into the play of the latter; and the observer, forgetting to consider birthday age, reports that the ten-year-old has the usual play interests.

Reports by gifted children themselves, when carefully compared item by item with reports similarly rendered by unselected children, show that the former know more games of intellectual skill, such as chess and bridge; that they care less, age for age, for play which involves predominantly sensori-motor activity, without a "score"; and that gifted girls are far less interested in traditional girls' play, as with dolls and tea sets, than unselected girls are. The gifted enjoy more complicated and highly competitive games than the unselected do, age for age. Outdoor sports hold a high place with the gifted, being almost as popular among them as reading is.

On the whole, the play of gifted children is a compromise among their various powers. They follow their intellectual interests as far as they can, but these interests are checked in many ways by age, by physique, and by tradition. The nine-year-old of IQ 160 may be deeply interested in tennis, but he is more or less debarred from the game because his physical and motor development is unequal to it. He may like to play bridge, but others of his age who are available as playmates do not know how to play it, and he is not allowed to sit up at night, when his elders play. He works out an adjustment by seeking companions who are somewhat older than himself, and whose play approximately satisfies him.

Only young children so extremely gifted as to test above 170 or 180 IQ seem to have noticeable difficulty in play. Of six children testing above 180 IQ, known to the present writer,

only one had no noticeable difficulty in play during early childhood. The others were all so divergent in play interests that parents and teachers noticed their divergence. One of them was unpopular with children of his age because he always insisted on reorganizing the play into a complicated pattern, with some remote and definite climax as the goal. "He could never be satisfied just to toss a ball around or to run about pulling and shouting." Children of six years are ordinarily incapable of being interested in long, complicated games, leading to remote goals, but are, on the contrary, greatly satisfied by the kind of activity that bored the child of IQ 187. They naturally resented persistent effort to reform them and to organize them for the attainment of remote goals. The result was that the child of IQ 187 was rejected by those of his own age and size. But when he sought to join the play of children of his mental age (about 12 years) he was also rejected, as being "a baby" and "too little to play." The child, thus thrown back upon himself, developed arithmetical calculation, collecting, and reading as chief forms of play.

Another child, also of IQ 187, never played with the children in the kindergarten to which he was sent. He regarded the others in a kindly way, often standing by to observe them but not participating. His play, when he was from four to five years of age, was chiefly found in tracing out astronomical charts, reading, and compiling statistics of his "imaginary country." Still another of these children, of IQ 184, shut off from those of his age by his intellectual ability and from those of his intellectual ability by his age, turned for play to designing, to arithmetical calculation, to statistics, to dictionary-building, and to collecting natural objects.

These young children of such extreme degrees of intellectual acuity fail to be interested in "child's play," in the same way and for the same reasons that the adult man or woman of

analogous intellectual status fails to be interested in custard-pie movies, in cock-fighting, in chute-the-chutes, or in pink teas. It is futile, and probably wholly unprofitable, to strive to interest the child of IQ above 180 in ring-around-the-rosy or in blind-man's buff. Many well-meaning persons speak of such efforts as "socializing the child," but it is not in this way that the very gifted can be socialized. They require some form of coöperative enterprise which is suited to their mental grasp. The problem of how this is to be achieved we shall consider in connection with the discussion of education.

It has been stated that gifted girls are much less amenable to traditional girls' play than unselected girls are. As an illustration of this relative lack of interest in such pursuits, may be cited the case of a girl seven years old, of IQ 170. The mother of this girl wished to learn from psychology how to manage her daughter so that she would "grow up to be a lady." The mother complained that the child had never cared for dolls, that she would not take an interest in her clothes, and that she would do nothing after school but read or play "rough games" out of doors. "How," inquired this mother, "would you break her of the habit of climbing lamp-posts?" This child craved action, and could not be satisfied with the outline of relatively sedentary behavior prescribed for little girls. When asked why she did not care for dolls, she replied: "They aren't real."

Children of intelligence so extreme as to fall above 170 IQ by test are, of course, so rare as to be met but seldom. It is rather the behavior of those falling into the range between 130 and 150 IQ which has been most studied and which must be much more frequently considered in the daily practice of the home and school. These children usually play heartily and are not observed to deviate from the ordinary in play interests because they commonly mingle with playmates who

are older. They deviate in fact only in that they enjoy given forms of play at a somewhat earlier age than average children.

IX. INTEREST IN READING

Very early interest in and ability for reading is a conspicuous symptom of superior intelligence. Many gifted children learn to read before they enter school. The gifted are omnivorous readers, but certain preferences are nevertheless characteristic of them as a group. For instance, they like dictionaries, encyclopedias, and atlases much more than average children ever do. They are more interested in such reading matter before they are ten years old than the average person ever is at any time during life. Frequently they compile encyclopedias and dictionaries for themselves. An eight-year-old boy of IQ 188 won a prize at school, which turned out to be a book of adventure. He asked the teacher if he might exchange it for a dictionary. The request being granted, he took the dictionary home and read it from cover to cover.

Detective stories are also greatly liked and are ranked above crude adventure in the preference of gifted children. Books dealing with astronomy occupy a unique place in their interest, and they like books about natural phenomena of any kind. Fairy tales are positively disliked by some of the most intelligent children and do not rank very high on the lists as a whole. Biography was liked by one group which had made a special study of biographies. By the time they are ten years old, the gifted become much interested in romance. *Ivanhoe*, *The Scottish Chiefs*, and similar romances are often mentioned at this age as favorite books. The stock juvenile literature is almost entirely outgrown by the time these children are ten years old.

Coy studied the magazine preferences of bright children in Columbus, Ohio, and found that among children testing

above 119 IQ magazines which deal with history, current events, science, and humor were more often read than among unselected children of the same age, the most striking difference being in the case of scientific magazines. More than half of Coy's group fell below 130 IQ, and the results for those above that point are not given separately; so that we cannot say how much of the difference between the two groups compared (the bright and the unselected) is in this particular due to those whom we have here arbitrarily determined to designate as gifted.

X. AMBITIONS FOR CAREER

In 1918 Whipple listed the ambitions of the gifted children in the class then being conducted under his supervision. Subsequently Coy, Terman, and others have reported on this topic. Also, many case studies of individuals have been made available, showing what ideas of career they have expressed. In general, the results of these studies suggest that the gifted need to have provided for them plenty of information about the various kinds of intellectual work which are needful in their day. Many of these children list ambitions which are below their capacity. Whipple found a child of IQ 141 who was ambitious to become a stenographer. Coy tells of a boy of IQ 130 who wished to be an electrician. Though on the whole gifted children record ambition for literary, scientific, artistic, or professional careers, by no means all do so.

It may be argued that childish ambitions are insignificant; that it is of no moment whether ambition is commensurate with ability at the age of ten or twelve years since the career motive has ample time to develop later. We should disagree with this point of view, for it is known that attitudes and ideals formed in childhood have an important influence in shaping the life that follows.

It may be argued, too, that it is socially desirable for some intellectually gifted persons to enter the vocations which do not require a very high minimum of intellect for their practice. Such arguments are largely matters of social philosophy, and do not call for the expression of an opinion that must be merely arbitrary. In any case, the statement surely holds that education should give the best intellects information about the careers of which they are capable, in order that they may formulate worthy desires for work which will bring them peace of mind.

In reports by unselected American school children as to their present ambitions for vocational careers, a large majority of them state that they intend to enter professional, artistic, or business careers, these ambitions being but slightly related to the capacity of the individual for achieving them. The lofty ambitions expressed by a majority of the gifted are, therefore, by no means peculiar to them alone. Two ideas, however, appear among them, which are scarcely ever seen in the reports of others. The first of these is the ambition to become a learned person — "a zoölogist," "an astronomer," "a mathematician," and the like. The other is the ambition to become a minister or missionary.

Typical instances of the ambitions of gifted children are the following, cited from various investigators:

Boy, IQ 143. Will study zoölogy, "because father is a zoölogist, and animals are so interesting." (Coy.)

Boy, IQ 162. Will take up the oil business, "because there is a lot of money in it, and because I like the work, and I have a lot of relatives in that business." (Coy.)

Girl, IQ 159. Will teach school. "I think I am better fitted for that work." Also music. "I like to hear the notes blend together in beautiful harmonies." (Coy.)

Boy, IQ 187. "I want to work at whatever has the most mathematics in it, when I grow up." (Hollingworth.)

Girl, IQ 189. "I will be a physician, and combine that with music, painting, and story writing." (Hollingworth.)

Boy, IQ 156. Expects "to go to college, and take up scientific agriculture." (Terman.)

Girl, IQ 133. Will be "a piano soloist." Expects "to graduate from university at 21 years, then marry and go on with piano work." (Whipple.)

The stability of these vocational ambitions remains undetermined. Probably they will be modified considerably, with additional knowledge of the possibilities of career. On the whole, the ambitions expressed are worthy and are capable of bringing satisfaction, if followed, to persons of a high degree of intelligence.

XI. DISCIPLINE

Among juvenile offenders in children's courts and in correctional institutions, gifted children are almost never found. A few children of better than average intelligence, testing up to about 115 IQ, are found in such circumstances, but children testing above 130 IQ are very far to seek among juvenile delinquents and truants. No doubt such cases may occasionally occur, but the present writer has never seen a child of IQ above 130 under arrest, and has found no authentic mention of such a case in the literature of the subject.[1] Juvenile delinquents show a mean IQ well below 100, with very few cases reaching higher than 115 IQ. The same statement holds good for truants. These facts are in harmony with the ratings of teachers and parents, previously discussed, which place the majority of gifted children above average in character.

As for discipline in the classroom, teachers experienced in the regular grades, who undertake special classes for gifted children, report almost unanimously that discipline "is easy," "is reduced to a minimum," "is not necessary." The only respect in which these children are troublesome seems to be

[1] In the cases of Leopold and Loeb, in Chicago, the IQ's of the offenders were not published, but from scholastic achievement high IQ's would be inferred.

in the matter of orderly discussion. It is hard for them to keep silent when they wish to express ideas. The tendency is, therefore, to speak in chorus and thus to create an atmosphere of confusion. Whenever any question is raised in such a class of children, nearly every one of them will have an idea or suggestion which he wishes to offer. There will, however, rarely be time enough for everyone to speak on every topic introduced. Each child must learn to hold his tongue, to listen quietly to others, to speak according to some order of procedure, and to restrain disappointment at failing to be heard.

These habits seem especially difficult for gifted children to form. No doubt a cause contributing to this difficulty has been that each of the children has already formed contrary habits. The children studied in the classroom up to this time have not been segregated at the time of entrance into school, but only after several, or at least a few, years of attendance in the regular grades. Each comes from a group in which he has usually been by far the most able member. A child who "always knows" has opportunity to do much more than his share of the talking in such a class, because finally the question comes to him when others do not answer. By the time he is placed in the special class, he has formed the expectation of being heard on all "hard questions" and of answering them himself. To sit silently by and hear others discuss at length is contrary to habit. The tendency at first, therefore, is to resent the astonishing fact that here are pupils nearly every one of whom knows as much or more than he does and who are themselves prepared and eager to talk. He feels the impulse to be heard according to his custom and speaks out of order, along with all the others also speaking out of order for the same reasons. The result is hubbub until orderly habits can be formed. Regulations governing speech are, therefore, among the most

carefully to be considered and enforced by the teacher who undertakes a special class for the gifted. Gradually the children will learn to govern themselves in this particular.

Other minor and temporary problems of discipline are likely to arise just at the outset of a special class. These problems also have their origin in the necessity for adjustment to others of equal powers. For instance, at the beginning of such a class, a fight ensued between two children, each of whom had previously been accustomed to unchallenged supremacy in school marks. In an examination both boys received the same top score. One of them somewhat superciliously extended his hand to shake that of the other, seated near him, but the latter pointedly ignored the gesture. At the noon recess they fought, involving a certain number of the other children in the discord through sympathy. This, of course, created a temporary demand for discipline. Later these boys became reconciled and were good friends.

Some teachers also report that at first there is a tendency to laziness about detail in the gifted who are segregated for special classes. Some of them expect to get through the day without serious effort. This fault also arises no doubt from habits formed in the regular grades. Competing always successfully with children much less able, the gifted soon become accustomed to put forth a minimum of effort at school, and do not know what it means to have to do a full day's work in order to excel. They must gradually unlearn the habit of wasting time at school.

Discipline by self-government is possible to a greater extent in such classes than among unselected children, age for age, because they more readily learn what conduct will bring comfort and other satisfactions and more readily perceive how and when to act upon what they have learned. Intelligence is an indispensable part of the foundation upon which to build

self-government. That the good conduct of the intelligent is altogether a function of their intelligence cannot, however, be assumed. To know the right is not necessarily to do the right, as is demonstrated by the occasional moral deviate among intellectually gifted persons. But one who has for a long time observed a large number of gifted children, knowing them for what they are intellectually, must have received an impression that they are temperamentally more disposed to fair play, sympathy, kindliness, and honesty, than are children at large. They seem more sensitive to the appeal of honor, of truth, and of responsibility than older children of equal mental age but of lower IQ, and certainly more sensitive to such appeal than unselected children of their own age. For example, twelve-year-olds do not commonly weep for the violation of abstract principles in remote times; but the six-year-old, of IQ 187, wept for the tax-burdened people of a remote time. The "mental age" of this child, which was about twelve years, does not by itself fully account for his sympathy. There must also have been a *disposition* to react in that way toward suffering.

All the facts of their psychology obviously have implications for the discipline of the gifted both at home and at school. In the first place, they cannot be bluffed into a given course of action, as young children ordinarily can be. There are few situations mingling more elements of comedy and tragedy than that in which a parent tries to manage a gifted child by bluffing. The child readily detects the gross absurdities involved in the parent's behavior and the insincerity of manner. He reacts by either disguised or undisguised contempt, according to his individuality.

Valid reasons for behaving in one way rather than another may be used much more effectively with the gifted than with children generally, because they more readily comprehend reasons and learn to act in accordance with them. Appeals

to respect for the rights of others are with them particularly effective, too, because intelligence enables the child to put himself in another's place. Straightforward dealing, honest rewards for merit, and honest punishment for wrong-doing, with reasons given for right and wrong behavior, will secure discipline with these children in the majority of cases. This is not to say that the routine of habit formation may be neglected, but rather that these may be utilized effectively as aids to habit formation.

There will, however, be a few children among the intellectually gifted with whom these means of securing discipline will not avail — children in whom superior intellect is combined with the vicious temperaments more usually found in combination with inferior intellect. Such cases call for individual consideration, each in its own circumstances. Self-interest may finally win from such a child sufficient adjustment to the social order as he matures. Occasionally, however, one deliberately decides to abandon all the conventions and laws which have been set up as social controls and to act on his or her own original conception of good and bad. Such individuals may, and no doubt do, commit unscrupulous or criminal acts as adults.

With the very intelligent, such sanctions for conduct as "because I say so," or "because that is the way" have little weight. Blind obedience is not to be expected. They are continually examining and questioning the sources of authority, and sanctions must be something more than arbitrary, in order to be genuinely accepted by them.

The formation of ideals through hero-worship is another means of character building especially effective with these children. Both by intelligence and disposition they are fitted for allegiance to heroes, either persons whom they know, or persons of whom they have read. Give a gifted child the right

hero, and much will have been accomplished by that alone toward his discipline.

SUMMARY

The facts chiefly to be remembered about the character and temperament of gifted children, which have important implications for their education and ultimately for their function in society, are that the gifted are rated above average in traits of character which make desirable citizens; that they are usually underestimated by parents and by themselves; that they are rated above average in nervous stability, and neurotics are few among them; that they are named as leaders much more frequently than chance would allow, the likelihood of popular leadership in an unselected group decreasing markedly, however, beyond IQ of about 150.

The gifted are greatly interested in play and tend strongly to choose playmates of their own mental age, which often results in social grouping with older children. When the intelligence quotient is extremely high, falling into the highest one hundredth of one per cent, the discrepancy between physical size and intelligence becomes so great as to render a satisfactory choice of playmates difficult. In these cases the child often falls back upon some form of solitary, intellectual play, such as intricate puzzles, mathematical calculations, reading, designing, chemical experimentation, radio, and the like. Attempts to interest extremely intelligent young children in the forms of play ordinarily enjoyed during early childhood are futile. At best the child can display but a polite acquiescence and conceal the boredom he really experiences.

Nearly all gifted children love to read, and will read anything they can find. The chief problem of education here is to provide such literature as will mold taste and give most profit in after-life. Especially those who test above 150 IQ

greatly enjoy encyclopedias, dictionaries, and other compendia of classified information.

The discipline of the gifted may be accomplished much more fully than in the case of children generally, by valid appeal to reason, by hero-worship, by presenting other people's points of view, and by consistently giving merit its just reward. Bluffing, appeal to arbitrary authority, dishonest attempts to cheat merit of its dues, unfortunately observed all too often among parents, are especially likely to meet with the contempt they deserve, when practiced upon the gifted. Corporal punishment becomes inappropriate for gifted children at an earlier age than is usual. It will arouse long cherished resentment in them at an age when children ordinarily soon forget the incident itself, the effect only remaining. The average child will not deeply and long resent a punishment inflicted upon his person until after the age of eight or nine years; but it becomes "too late to spank" an intellectually gifted child much earlier in childhood.

On the whole, the gifted are reasonable, and easy to discipline if the elders are intelligent, honest, kind, and admirable. Fortunately, the majority of gifted children fall by heredity into the hands of superior parents, who are themselves of fine character and worthy to "set example."

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CHAPTER VI

Development

I. INFANCY OF THE GIFTED

Our knowledge of the infancy of the gifted rests at present upon the insecure and fragmentary data of parents' retrospections, and of the "baby-books" which they have kept. The "baby-books" are somewhat more reliable as a source of information than are the attempts to recall events not recorded. Since mothers who keep "baby-books" are doubtless distinctly above average intellectually, a gifted child is more likely to have had such a record kept than is a child chosen at random. This being the case, a considerable amount of such evidence concerning the gifted is available.

The data suggest that gifted children walk and talk earlier than unselected children do, as a group. Among the very gifted there is often a record of walking and talking at nine months of age, or even earlier. Twin girls, reported by Gesell (see Figure 23), of IQ above 180, rose spontaneously into the sitting posture at six months, and spoke *in sentences* by the time they were eleven months old. Betty Ford, reported by Terman, began to walk at seven months, and "at nineteen months said everything clearly, and knew the alphabet." The majority of children above 150 IQ, whose histories of infancy are known to the present writer, walked or talked, or both walked and talked, at an earlier age than usual. On the other hand, a small minority of such children show nothing unusual in these respects, and a few walk and talk even later

than the average child, according to their mothers' records; so that the beginnings of walking and of talking, respectively, are not invariably symptomatic of intellectual status.

Terman's most extensive data show that early development of speech is a more significant symptom of intellectual superiority in infants than is early development of locomotion. "Comparison of our means shows that our gifted children walked about one month earlier and talked about three and a half months earlier than Mead's normal children." This finding becomes even more highly significant when we recall that the infants whom Mead supposed to be "normal" were chiefly the offspring of graduate students in a large university — children who are now known to test well above the average, as a group. In the comparison with Mead's data, walking means "to take a step unassisted," and talking means "to use a word intelligently, *i.e.*, to associate the idea with the object." Comparison of the gifted with infants who are really typical of the species would no doubt yield even more significant differences between means for speech and locomotion, particularly for the former function.

In all these records kept by parents we have, of course, the difficulty that there are no universal criteria of what constitutes walking or talking. Some mothers record the date on which the child first made a sound resembling an articulate syllable, such as "ma" or "boo," as the beginning of speech. Others do not record talking until the child has put words together. Similarly the concept of walking varies greatly from mother to mother. Some consider that the child walks when it makes a step, holding to a support. Others record walking only when the child can go alone for several steps.

Direct study by psychologists would obviate these difficulties of interpretation, but the obstacles to the scientific study of infants are numerous. In the first place, infants are rarely

collected for considerable periods of time, except in foundling asylums, where an unfavorable selection is obtained. In the second place, even if it were possible to collect any infants we might wish, we should not know with certainty how to choose in order to secure those who will be gifted children. In other words, we cannot now detect the gifted in early infancy. It is, nevertheless, becoming more and more possible to predict with reliability whether a given infant will later test in the highest percentile for intellect. If records were to be uniformly kept, for instance, of all infants born to parents both of whom are college graduates, we should find eventually that a large number of records had thus accumulated of the infancy of children testing above 130 IQ.

Developments of infancy other than walking and talking are likewise noted at an earlier age than usual, in the majority of cases. If, as is conventional, we consider infancy to include the first three years of life, then attainment of an unusually wide vocabulary, mastery of the alphabet and of the digits, and in some cases ability to read, are found in these infants. Mothers very frequently report that they "cried very little" and were "easy to care for" as babies.

It has already been pointed out that records of "baby-books" and other statements by parents of the gifted give a mean weight at birth of about one pound above the norms. This is in accordance with their greater size during childhood, at all ages so far studied. Other characteristics of physique in infancy are still to be ascertained.

II. DURATION OF GROWTH

The period of physical growth for human beings has been fairly definitely established as continuing from conception to the age of about eighteen years, on the average. It is possible that the average curve of physical growth continues

to rise very slightly after eighteen until sometime in the early twenties. However, the increments of size after eighteen, if any, are very slight. In fact, the average curve shows a strong tendency to a static course after the sixteenth birthday, height increasing very little after that age. Increments of weight, which come with later maturity, are due to deposits of fat in the tissues and not to growth in the biological sense. Actual curves of growth, plotted year after year for the same individuals (in order to avoid errors due to the constant dropping out of "selected" cases), do not often go beyond eighteen years. This is because eighteen is the average age of graduation from secondary school, and the record cannot be continued thereafter without too great difficulty. Curves thus far plotted have, however, so nearly ceased to rise at eighteen, that it is certain we shall find a scarcely perceptible increase in size, if any, after that age, on the average. There are, of course, marked individual differences in duration of growth, as in all other organic structures and functions. Some individuals are full grown before the eighteenth birthday, and some grow to a slight extent for an unusually long period.

As regards mental growth we have far fewer data, and consequently we are far less certain of the shape and the limit of the typical developmental curve. Present data indicate that mental growth, like physical growth, begins at conception and continues until some point in later adolescence. Present methods of measurement show a steady rise of the curve of mental growth to the age of about sixteen years, and little, if any, rise thereafter. Apparently, the nervous tissue which is the physiological basis of mentality "gets its growth" at about the same time as the bony tissues of the skeleton.

Dissent by certain psychologists from the statement last made is chiefly in the direction of placing the average limit of mental growth below sixteen years. Within very recent

times certain data have accumulated, particularly from mental tests of adult recruits, which suggest that there is no increment of intellectual power in the average individual after the age of about fourteen years. Boys thirteen years and eight months old, in the public schools, did just as well as the average adult recruit in the army tests.

There are certain objections to considering the results from the army tests as final. The data are imperfect in ways which have been discussed at length in the references appended to this chapter, and which do not especially concern us here except to say that the imperfections are chiefly due to failures of random sampling. In our present state of research, we can only say that in the average person, that is, the person of 100 IQ, at some point between the thirteenth and the twentieth birthdays, intellectual power approaches its maximum development and thereafter shows negligible increments, if any.

This statement, that intellectual capacity does not increase beyond the period of adolescence, does not mean that a person cannot continue to learn after that age. A person may keep on learning new facts and skills as long as he lives, or, at any rate, until he is extremely senile. But all these new acquisitions will thereafter of necessity be limited in degree of complexity and subtlety by the degree of intellect then attained. The condition may, perhaps, be likened to the condition of looms. Looms when completed are of various degrees of capacity for weaving complex and subtle patterns. A loom of simple capacity can go on as long as it lasts, weaving new patterns, a given degree of complexity not being exceeded. The neurones can go on as long as a person lives, learning new patterns, but these patterns may not exceed the capacity of that person. If they do, they will not be achieved. Nothing but a chaotic tangle results from forcing a complex pattern upon a simple loom. Only confusion and failure occur when

a complex problem is forced upon a mind incapable of assimilating it. That same mind will, however, continue indefinitely to learn what is of an appropriate degree of simplicity.

Gifted minds are, by definition, those with greatest capacity for complexity and subtlety. At present it is not known whether the period of mental growth differs in their case from that of the average. Kuhlmann has demonstrated that in the case of the extremely stupid, who are as far below the average as the gifted are above, intellectual growth appears to cease earlier than on the average, and that this cessation is in proportion to the degree of stupidity. Such a finding suggests the presence of a positive correlation between degree of intellect and duration of the period of growth, which in turn would mean that the more intelligent a member of the species is, the longer he is likely to keep on growing. Such a possibility is at present speculative, but it may be that the gifted continue to show slight increments of capacity after the age at which the average person has finally matured. For example, pupils of the quality found in high schools yield increasing scores in tests of intelligence up to eighteen years of age at least.

III. CONSTANCY OF INTELLECTUAL STATUS

The question as to whether the intelligence of a given individual maintains the same relative status throughout the period of development and at its close, has been studied eagerly during the past ten years. Since the intelligence quotient has come into use as an expression of intellectual status, the question has been asked in this form: Does the IQ remain constant? There has been a widespread superstition that gifted children grow up into dull men and women or at best become mediocrities as they mature. So prevalent is this superstition even yet, that parents sometimes are inclined to worry when told that their children are bright.

We have just spoken of the possibility that the IQ may be not a constant, in the case of exceptional children, but a decreasing variable in the stupid and an increasing variable in the gifted. The amount of decline in IQ, demonstrated among the stupid by Kuhlmann and also by Doll, is very slight, however. Likewise, the amount by which gifted children test higher in IQ from year to year is very slight and might well be attributed to mere familiarity with the tests, were it not for the *decline* in IQ for the feebleminded. In any case the inconstancy of the IQ is slight and raises a problem of development which must wait upon much more extensive research for final solution. We consider it here only because it bears upon the question of constancy of status. Until the question raised has received a final answer, we cannot state positively that the IQ is constant. From data so far collected, we can only say that the IQ is certainly constant within narrow margins, but that it is better to ask the question as to constancy of intellectual status in another way at present. It is better to ask, Does the percentile position of an individual remain constant? Do those who rate in the highest per cent at one time continue to rate in the highest per cent as they develop, and so on for those in all other percentiles?

Retests, made in some cases over a period as long as ten years, show that the position of a given child does remain constant, within predictable limits. Such "limits of error" characterize all measurements, but they are proportionately greater in the case of mental measurements than in the case of physical measurements, and this is likely to remain true even when the means of mental measurement have been ultimately refined.

In Figure 20 we have mental growth curves, plotted in terms of months of mental age, of two children of about the same birthday age, one of IQ 187 and the other of IQ 66. The

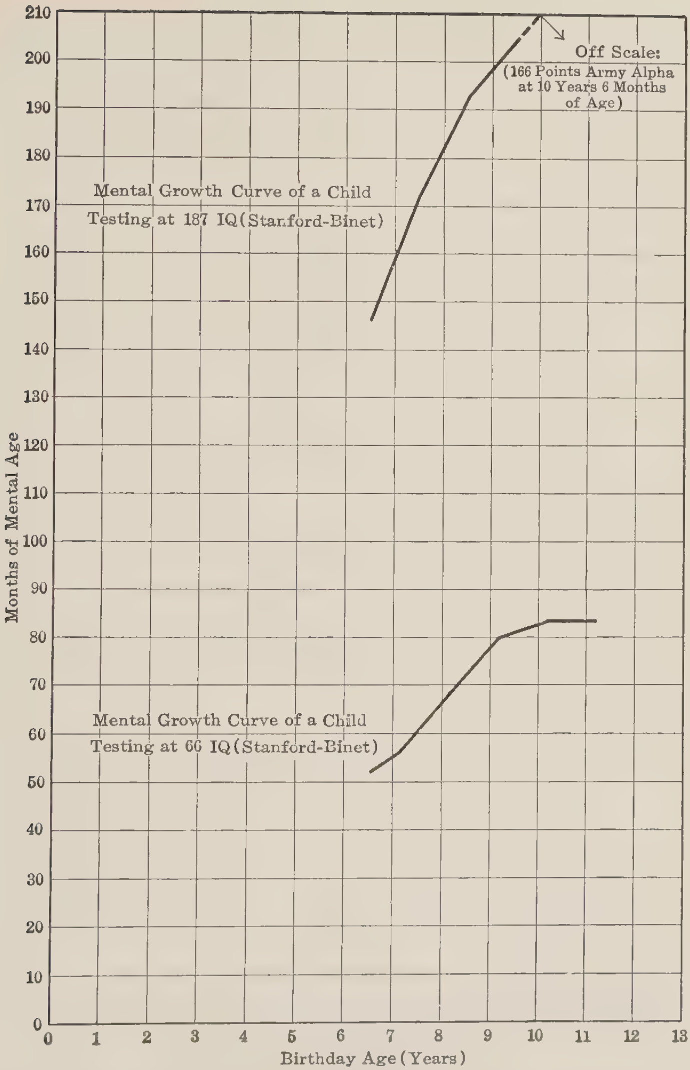

FIG. 20. — Showing curves of mental growth, year after year, of two children, one gifted and the other feebleminded. Note that the same relative positions are maintained.

curves are not perfectly smooth. They fluctuate slightly, through "errors of testing," but they maintain the same relative positions. The gifted child remains gifted, year after year; the feebleminded child remains continuously feebleminded. Neither curve shows any trend toward mediocrity, as time goes on.

Fluctuations due to variable "errors of testing" are neutralized, when a group instead of an individual is retested. At The Child Welfare Research Station, in Iowa, a group of superior children and a group of average children were both retested, year after year, and the successive results for each group were plotted, as shown in Figure 21. These curves clearly demonstrate that intellectual status is constant, within very narrow limits. The superior group remains superior, the average group remains average, year after year. There is no tendency whatever for the two groups to approach a common limit. All accidents of environment experienced by the children of these groups, over a period of eleven years of development, have not affected their relative positions as regards intellectual capacity.

The superior children shown in Figure 21 were not, as a group, sufficiently above average to qualify in our category of the gifted. They were rather what we would call bright children. A group all testing above 130 IQ would yield a curve traveling above that of the superior group shown in Figure 21. The truth of this statement appears from Figure 22, which shows the slant and altitude of a curve, plotted from three annual tests of a group of children, all above 135 IQ.

Psychologists no longer doubt that it is now possible to predict when a child is six years old, what his relative position will be in the total range of intellects when he is sixteen. With means of classification at present available, there will occasionally be a case showing considerable fluctuation in re-

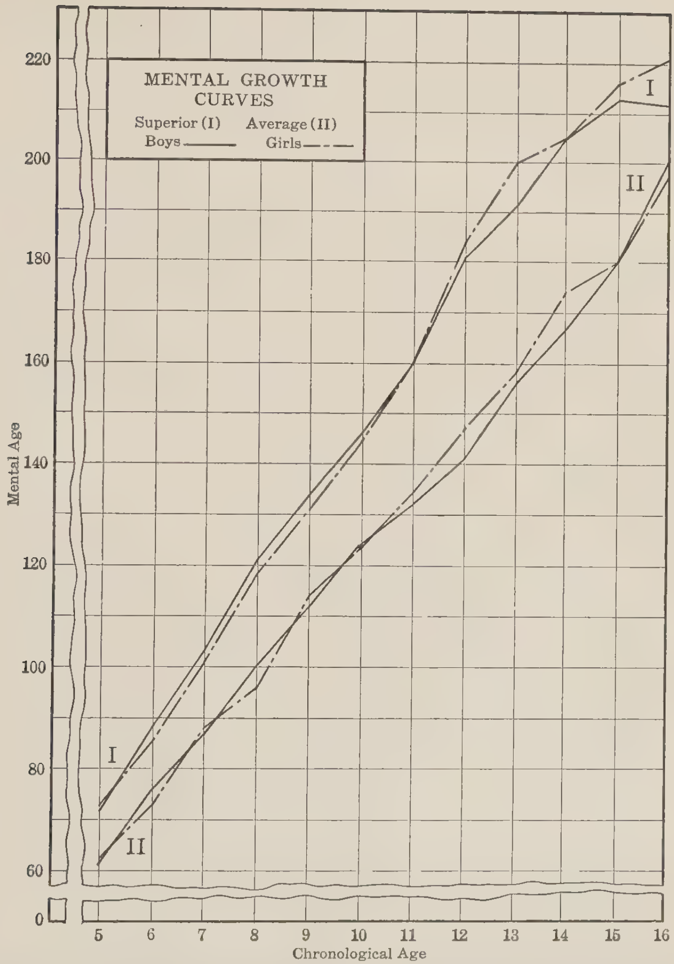

FIG. 21. — Showing intellectual development of superior children, in comparison with average children, year after year. (From "Additional Data from Consecutive Stanford-Binet Tests" by Baldwin and Stecher. Reproduced from *Iowa Studies in Child Welfare.*)

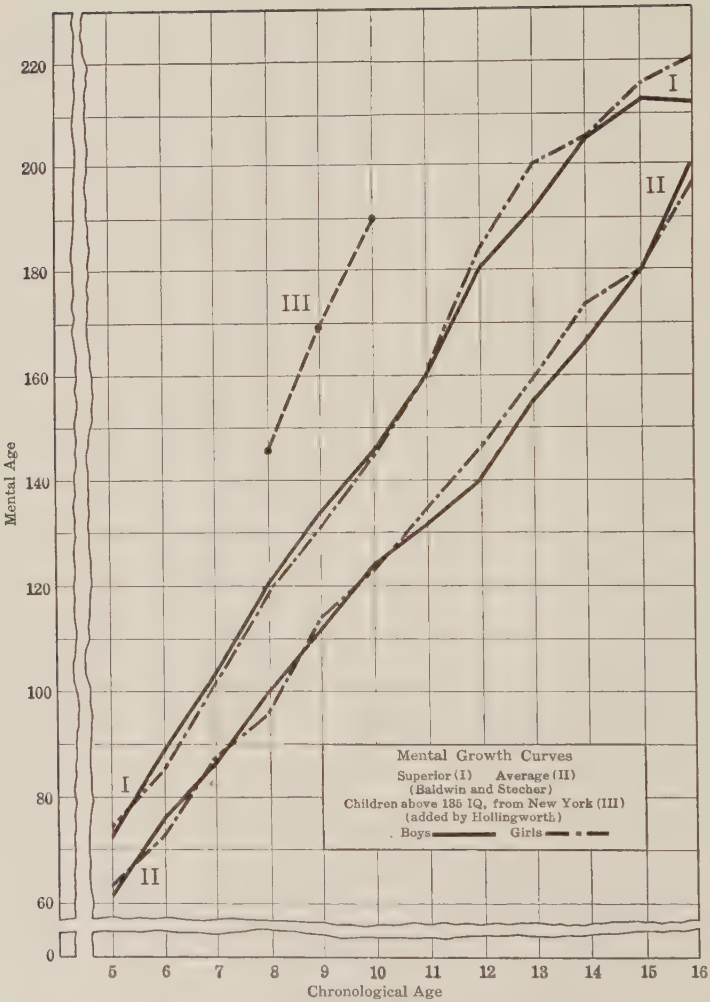

FIG. 22. — Showing curve resulting from three annual tests of a group of children, all above 135 IQ, in comparison with the groups of Baldwin and Stecher.

sults from one test to another, even with the most skillful of examiners. In the great majority of cases, however, though present methods are capable of much improvement, the "error" or fluctuation in IQ from test to test will not exceed $\pm$ 5 IQ. That is, most children who at or after six years of age test at a given IQ, are not likely to test either higher or lower than that on subsequent occasions, to an extent in excess of 5 IQ. As methods of testing become more exact, the amount of this margin of error will, of course, correspondingly diminish.

Because of existing imperfections in construction, scales like Stanford-Binet which have been most widely used to classify gifted children, cease to yield a maximum measure of the gifted long before they reach maturity. Children above 150 IQ begin to exceed the upper limits of this scale by the time they are eleven years old, and are thereafter no longer fully measured by it, because it does not provide enough tests of sufficiently diversified difficulty at the higher levels. This scale, and others like it, do not provide complete measurement from six years to maturity for any but those who test below IQ 120. Moreover, another imperfection, namely the fact that in the higher reaches of the scale the "steps" of increment are so large (four months, five months, and six months of mental age), causes the IQ of the very young and gifted to appear to fluctuate more markedly than with average children. These manifestations of imperfection in the methods used are sometimes mistaken for manifestations of development in children. It seems worth while, therefore, to note them here. Much research is now being done to devise complete and adequate scales and to refine methods. We have already made clear in Chapter II why present methods are not very reliable at ages earlier than six years.

IV. THE CONCEPT OF PRECOCITY

The word "precocious" means by derivation "prematurely done," or literally "cooked too soon." The term "precocious child" is quite often heard in connection with discussion of the gifted. In fact, gifted children are frequently called "precocious children" by those who have no exact knowledge of such developmental data as we have cited. The idea thus expressed is that the child is merely reaching maturity at an abnormally rapid rate; that he is reaching the common destination ahead of time; that he will be "done too soon." It is not realized that the child will actually remain in the period of immaturity as long as (or even perhaps a little longer than) the mediocre do, being simply superior to the latter at every point in the course of development *and also at maturity*.

We have seen that scientific measurement of mental traits does not reveal cases of precocity. Children mentally "old for their age," that is, of high intelligence quotient, who have been remeasured year after year, show not precocity but superiority. They are not "done" at an earlier age than others. They simply are of a mental caliber that exceeds the average, and this superiority is maintained as growth terminates.

Therefore, the concept of "precocity" seems to have no warrant in connection with the psychology of the gifted. It is misleading in connotation, and discussion of the subject would be improved by dropping the term. If at any time in the future more extensive research should reveal that there exist children whose apparent brightness is but the manifestation of an abnormally early, but mediocre, maturity, the term "precocious children" could be revived to describe them since so used it would be warranted.

V. THE ILLUSION OF RETROGRESSION TOWARD MEDIOCRITY

The erroneous idea that young children of very superior intelligence decrease in ability as they mature, is no doubt founded in great part on an illusion due to selection during school life. When children enter school, they all go together into kindergarten or first grade. Nearly the whole possible range of intellect is represented, and the superior seem extremely able by contrast. With every year of school beyond the first, however, some of the dullest children are "left back," while some of the gifted occasionally "skip a grade." Selection thus continually occurs, until by the time high school is reached, nearly all of the dull have been eliminated from the competition, through failure to be promoted, or by voluntary withdrawal from school. The comparison of the bright is now with a rather highly selected group. The process of selection continues through the high school and again through college. A child of 130 IQ is very much more able than the average *of his group* in kindergarten or first grade; still above, but not so much above, the average *of his group* in high school; and in college, if the college be first-rate, he is but an average member *of his group*. His intelligence quotient does not decrease, but he competes with ever more and more highly selected persons, till finally (in college) he is in a group so severely restricted that the median member of it is as able as he is. He wins approximately average standing in such a group; but he has not become mediocre in the sense of having suffered a reduction in IQ. It is merely that a majority of his competitors are now as able as he is, thus creating the illusion that he has retrogressed. This shift in the basis of competition explains why high school teachers are often disappointed in their predictions of brilliant college careers for those who have done well in small high schools. A pupil must be not

only above, but very far above the average of his group in high school, in order to win honors at college. The mean IQ of those who win high honors for scholarship in college is not precisely known, but it is undoubtedly far above 130.

VI. PHYSICAL DEVELOPMENT

Most of the known facts about the physical development of the gifted have already been discussed in Chapter IV. We have set forth at some length the fact that gifted children are larger, stronger, and swifter, as a group, than unselected children, and that the majority of the former attain puberty at an earlier age than the latter. But it will be some time before investigators will be in position to state whether there is any correlation between intellect and *duration* of the period of physical growth. The hypothesis has been advanced by one or two students of the subject, that the greater size of gifted children will be offset by an earlier cessation of growth, so that they will be no larger than average persons as adults. This hypothesis is probably false, since Baldwin has already shown by repeated measurements that children large at any age tend strongly to be large at all ages. In any event, we shall be obliged to wait for several years, until children of known IQ shall have been remeasured annually up to and including the age at which there are no further increments, before a positive statement can be made in this respect.

VII. PRESENT CONDITION OF KNOWLEDGE

Our discussion of development has been conspicuously brief. This brevity is due to lack of knowledge. It does not take long to summarize all that is now scientifically known about the development of the gifted. We have a large amount of genuine knowledge concerning the census, the origin, the character, the physique, the achievement of gifted children;

but concerning the altitude, the trend, the constancy, and the limits of developmental curves from birth to maturity, we know little. This condition of affairs is, of course, due to the fact that development can be fully and quantitatively studied only by means of annual (or more frequent) remeasurements, made on the same individuals, over a period of at least eighteen years. Since scientific methods of identifying gifted children have been in use for only about ten years, it is obvious that adequate studies of their development cannot possibly have been accomplished at this time. We have at present only certain sections of the curves of mental and physical development, the longest of them covering a period of ten years.

Considering first mental development, we know that gifted children can be identified as early as six years of age, by present methods, and that the percentile status then indicated by test will be maintained, within narrow margins of error, to the age of sixteen years. We know, furthermore, that the age of sixteen marks practically the upper limit of intellectual growth, increments of capacity thereafter being slight, if any. We know that the apparent retrogression of bright children toward mediocrity as they mature is due to an illusion, which has its origin in scholastic and vocational selection. From kindergarten to university there is a constantly decreasing range of competitors, the dull being more and more completely eliminated from the original comparison as time goes on, while the bright child tends gradually to be included at last in a selection of pupils like himself. That a child who "was bright" in the first grade is but an average college student does not mean that he has been reduced to an IQ of 100 during development. To be an average student at college means that he is still bright. That he later has but mediocre success in a profession does not signify that he has become an average adult. To work at a recognized profession with ordinary success signifies

in itself that the person is above the average of the general population, intellectually.

As for physical development, we know that puberty is attained at earlier than the average age by the majority of intellectually gifted children. We know that at birth they are about a pound heavier, according to parent's records, than the norm for new-born infants, and we know that they are larger, stronger, and swifter as a group, than unselected children, at every age at which comparative groups have been measured up to this time.

VIII. PROBLEMS FOR THE FUTURE

Aside from these facts, which we may consider to have been already established by research, everything remains to be discovered concerning the development of gifted children. Some of the most interesting questions must wait upon further refinement of the technique of mental measurement. For example, we cannot discover *the shape* of the curve according to which intellectual development proceeds, until some unit of mental measurement shall have been devised. "A month of mental age" or "a year of mental age" is a unit chronologically, but not psychologically. For all we know to the contrary, the typical increment of intellectual growth between the third and the fourth birthdays may be five times as great as that between the thirteenth and the fourteenth birthdays. Certainly the typical increments in the case of height, for instance, are far from uniform from year to year, so that "a year of height" has no quantitative meaning, in speaking of development in stature. We know the shape of the curve for growth in stature, because height can be measured in units (inches or centimeters) each one of which is equal to every other, starting from a zero point which is known. We have as yet nothing comparable to the inch, in the measurement of

intelligence. We can measure only in terms of ratio to an average (the IQ), or in terms of percentile distribution. The true shape of the typical developmental curve cannot be ascertained in such terms.

Nor can the first years of development be studied quantitatively, until unselected children have been tested, by means as yet but tentatively suggested, from birth to the age of entrance into school. The prosecution of this research offers administrative problems which are difficult but by no means insurmountable.

The final limits of growth cannot be positively stated until gifted children now being measured have become adults. This is a matter of time, and of industrious patience on the part of investigators who have already accumulated records of retests on gifted children.

The question in regard to the constancy of the IQ, as to whether it may be an increasing variable in the case of the gifted, will also eventually be answered, when methods of measurement have been perfected. It is of academic, and perhaps of practical, interest to know whether the highest percentiles become proportionately further and further removed from the lowest percentiles, along the scale of intellect, as development progresses, or, in other words, whether the range of individual differences is wider at maturity than at birth. Such slight tendency in that direction as seems to have been manifested may be due merely to present imperfections in methods of testing, instead of to a genuine biological phenomenon.

Unsolved problems of physical and motor development are for the most part straightforward as regards method. Physique and movement in the earliest years of life cannot, of course, be intensively studied until it becomes possible to identify gifted children in infancy. The objective, quantita-

tive study of the gifted at birth offers special difficulties of identification. However, as we have stated, enough is already known about heredity to guide our investigation of even this period of development. It can be foretold with a very considerable degree of accuracy whose offspring should be chosen for the study of the gifted at birth.

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CHAPTER VII

Family History

I. SIGNIFICANCE OF FAMILY HISTORY

Under the influence of the political philosophy that all are born equal, it has become unfashionable in this country to show an interest in ancestry. One hears even intelligent people say, "I never took any interest in my ancestors. It doesn't matter who they were." Guided by this attitude, those in charge of orphanages and foundling asylums sometimes avoid making records of the family histories of their charges, on the theory that the past is of no consequence to the individual and may be wiped out by destruction of its record.

Certainly it is true that for purposes of voting, it is of no importance who one's ancestors were. But there are important aspects of life other than the political, in which biological principles function freely, regardless of popular philosophy. Reproduction of the species is one of these important aspects. Scientific biologists and psychologists in our day are agreed, without notable exception, that the potentialities of offspring are determined by their ancestral germ-plasm, or, in other words, that these potentialities are hereditary; and their studies are affecting practical life in various ways. For instance, in modern hospitals for the treatment of chronic disease, family history is elicited as a routine aid to diagnosis and prognosis. Especially when mental condition is in question, every effort is made to obtain a reliable family history. This routine procedure of practical medicine and applied psychology

rests upon the biological and psychological research of the past century, particularly upon experimental work done since the days of Darwin, Mendel, Weismann, and Galton. Those who are thoroughly acquainted with these researches take no pride in ignorance of their ancestry, for they are aware that knowledge of hereditary background is of vital importance for the rational conduct of life. The values of the pedigree have long been well recognized by those who deal in animals and plants, but it has not been popularly supposed that the same values apply in the case of human beings.

II. TWO FAMOUS FAMILY HISTORIES

The family histories most widely known are those of defectives and criminals, called by biologists cacogenic stocks. Dugdale's Jukes and Goddard's Kallikaks are among those most frequently quoted, to illustrate the way in which undesirable forms of behavior "run in families." The family histories of persons renowned for wisdom and virtue are by no means so well known, though several are available in the literature of genetics. Among these is the family history of Jonathan Edwards, a distinguished theologian, president of Princeton College. This family history is especially adapted to citation, because it includes both ancestors and descendants of the individual chosen as the starting point of investigation, just as the contrasted history of Deborah Kallikak does. It was in fact undertaken in order to learn what would be the outcome if a famous person were chosen, in the same way as Max, the progenitor of the Jukes, was chosen, and then investigated in the same manner as regards kinship.

Winship and Davenport were able to trace 1394 ancestors and descendants of Jonathan Edwards, among whom were 285 college graduates, 100 clergymen, 100 lawyers, 80 public officers, 75 officers of army and navy, 65 college professors,

60 physicians, 60 prominent authors, 30 judges, 13 college presidents, 3 United States senators, and 1 vice president of the United States. No criminal or defective persons were found in the kinship.

One of the great-grandfathers of Jonathan Edwards was remotely descended from royalty. The daughter of this man, Elizabeth Tuttle (or Tuthill), married Richard Edwards, "a lawyer of high repute and great learning." Of this marriage, Timothy Edwards, father of Jonathan Edwards, was the only son. Timothy Edwards graduated from Harvard in 1691, taking simultaneously the degrees of B.A. and M.A., a very unusual occurrence. For fifty-nine years he was pastor of a church in East Windsor, Connecticut, where his son, Jonathan, one of eleven children, was born.

Concerning the descendants of Jonathan Edwards, there are many records of distinction. There descended from him Jonathan Edwards, Jr., President of Union College; Timothy Dwight, President of Yale; Sereno Edwards Dwight, President of Hamilton College; Theodore Dwight Woolsey, President of Yale for a quarter of a century; Sarah, who married Tapping Reeve, founder of the Litchfield Law School, herself a lawyer in the day when women were not supposed to study law; Daniel Tyler, a general of the Civil War, and founder of the iron industry of Alabama; Timothy Dwight, 2d, President of Yale from 1886-1898; Theodore William Dwight, founder and for thirty-six years warden of the Columbia Law School; Henrietta Frances, who married Eli Whitney, inventor of the cotton gin; Merrill Edwards Gates, President of Amherst College; Charles Sedgwick Minot, famous biologist and embryologist of the Harvard Medical School; Winston Churchill, the author.

Descended not in the direct line from Jonathan Edwards, but from the daughters of Richard Edwards and Elizabeth

Tuttle, were other distinguished men and women, far too numerous to mention here. Every one of these four daughters, the aunts of Jonathan Edwards, had descendants who were famous. Among these were Robert Treat Paine, signer of The Declaration of Independence; Morrison R. Waite, Chief Justice of the United States; Ulysses S. Grant; and Grover Cleveland.

Elizabeth Tuttle, the grandmother of Jonathan Edwards, seems to have been a chief carrier of the germ-plasm, from which these famous persons originated. She is described by her contemporaries as a woman "of great beauty, tall and distinguished in stature," "of strong will, extreme intellectual vigor, of mental grasp akin to rapacity," attracting many by her charm, but inhibiting her impulses poorly. Twenty-four years after their marriage, Richard Edwards divorced her. He afterwards married Mary Talcott, "a woman of mediocre talents," ordinary in appearance, and had by her five sons and a daughter. None of these children became distinguished, and their descendants are ordinary in performance.

Among other family histories which have been traced from a famous person, is that of Francis Galton, compiled by Pearson. We cannot here do more than mention a few of the more eminent of Galton's kinsmen. Charles Darwin was his first cousin; Erasmus Darwin, his grandfather, was a man of letters; Robert Barclay, the Quaker, was among his ancestors. Pearson has traced Galton's ancestry in some of its branches back to primitive kings of the British Isles. He himself left no direct descendants. His family history has a special interest for us, because he did so much to clear the way for modern studies of heredity.

These family histories must be read at first hand, in order to be appreciated fully. It is typically the case that when a very distinguished individual is chosen as the starting point

of an exhaustive investigation into family history, the results are like those in the two which have just been cited. Galton demonstrated in his own work, *Hereditary Genius*, published first in 1869, that eminent persons have many more distinguished relatives than chance would allow. He concluded, also, that both likelihood and degree of distinction in kinsmen decrease rapidly as the degree of relationship becomes more and more remote, disappearing entirely with the fourth degree of kinship.

These studies of family resemblance and others like them have been carried out by means of interview, anecdote, and biography. The study of family resemblances in mental traits, by the method of mental tests, has recently been begun. The few researches which have been made by tests are of particular importance, because of the superior reliability of the method, and the feasibility of quantitative treatment of results.

III. TESTS AND MEASUREMENTS OF FAMILY RESEMBLANCE

Several studies of family likeness in physique have been made by the method of measurement; but we shall not discuss these in detail. Stated briefly, such studies show that there is a positive correlation between parents and offspring, and between brothers and sisters, in physique. Between brothers and sisters who are twins the resemblance is even closer than among ordinary siblings.[1] These facts of family resemblance in physical traits are popularly noted. The features of the new-born babe are eagerly scanned, to see whether he "takes after" father or mother. That the babe's mental capacities have been similarly determined for all time by ancestry does not often occur to those conducting the scrutiny.

[1] The word adopted to signify "brothers and sisters."

In 1905, Thorndike published the results of mental tests, made on fifty pairs of twins, in the public schools of New York City. The tests revealed a very high degree of resemblance between twins in mental ability, represented by a correlation

Fig. 23. — Showing how twin girls, of IQ above 180, resemble each other in appearance. (From Gesell's *The Mental Growth of the Pre-School Child*. Macmillan.)

coefficient of about .80.[1] The resemblance was as great in traits not susceptible to training, as in those which might be affected by similarity of environment. Moreover, the younger pairs resembled each other as much as the older pairs, which would not be expected if the resemblance were attributable to similarity of environment.

Recently Gesell has reported intensive tests of twin girls, of IQ above 180. Both physically and mentally, these twins are nearly identical. Figure 23 shows how similar they are

[1] *No resemblance* would be indicated by a coefficient of zero, whereas perfect identity would be indicated by unity, a coefficient of 1.00.

in what meets the eye. Figure 24 shows how closely they resemble in response to mental tests.

The theory of twinning at present current, as concerns the living substance from which human beings are derived, is

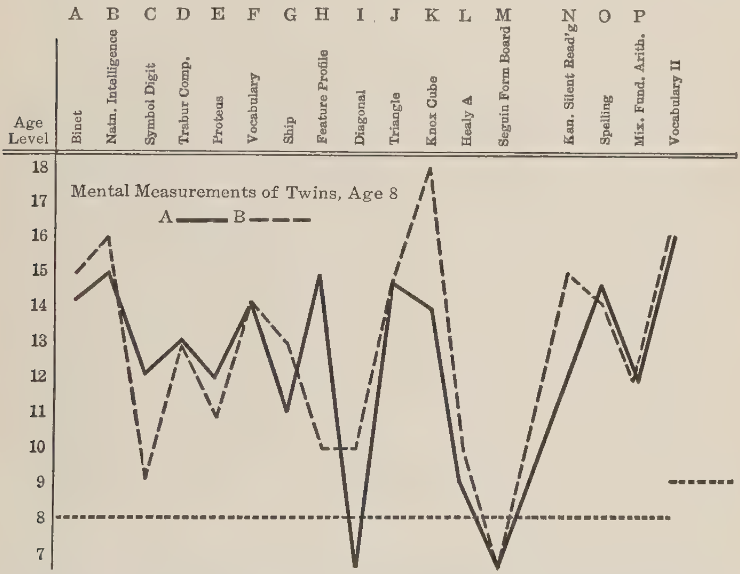


FIG. 24. — Showing how the twins of Figure 23 resemble each other in response to mental tests. (From Gesell's *The Mental Growth of the Pre-School Child*. Macmillan.)

that twins are genetically of two kinds: (1) similar or duplicate twins, who result from the fertilization of a single ovum, and (2) fraternal twins, who are derived from the fertilization of two separate ova, who may or may not be of the same sex and who show no more than the ordinary amount of resemblance of sibling pairs. Thorndike's research has cast doubt upon the validity of these two distinct and exclusive categories, because it revealed that unselected pairs of twins do not fall into two separate statistical groups, when measured. On the

contrary, they show all degrees of likeness, from complete unity to zero, in various traits, clustering about a single peak at .80. A possible explanation of this phenomenon is that there may be a third kind of twins, produced when a mature ovum divides into identical portions, which are fertilized by two different spermatozoa.

Recently evidence has been added to the accumulated knowledge about twins, showing that pairs of the same sex resemble each other much more closely in intellect than do pairs of opposite sex, although there is no difference in this respect between boys and girls within the total group examined. This fact favors the theory that there are at least two kinds of twins, those from one ovum fertilized by one spermatozoön, and those not so produced (since sameness of sex would be one undebatable characteristic of twins produced by the union of but one maternal and one paternal cell). It does not, however, inform us that there may not be more than two kinds of twins.

The discussion of twins need not be prolonged here, as it bears but indirectly upon the specific study of gifted children. Its connection with our topic comes through the light cast by twins upon the general principles of heredity as the cause of family resemblance. There is one item of information, derived from recent study of twins, which does directly concern the study of the gifted. Merriman's work shows that twins distribute themselves in tests according to the normal curve of frequency (see Figures 1, 2, and 3) as regards intellect. Twins, therefore, have just a normal chance to be intellectually gifted. They have no advantage, and suffer no handicap in intellect, by reason of plural birth.

Pintner has found that even with rough group tests there is a resemblance in the scores of siblings in general. Gordon found a coefficient of correlation near .50, between siblings

among dependent children, individual tests of intelligence being used. Correlation including the total range of intelligence would doubtless show a closer resemblance among siblings, for dependent children are a restricted group. They all resemble each other in competency, thus reducing the comparative resemblance of the siblings among them. Other investigators have demonstrated resemblance between siblings and between parents and offspring, in tests of general intelligence.

Aside from likeness in general intelligence, Cobb has shown that children resemble their parents in the four fundamental operations of arithmetic; Stanton, that there is family resemblance in response to tests of musical sensitivity; and others have offered fragmentary evidence of resemblance in other tests.

Beyond the first degree of kinship, there has been almost no systematic study of resemblances in test performance, either among the generality, or in special groups. Elderton found the average coefficient of correlation between performances of first cousins to be .27. Dexter tested one hundred and thirty-one pairs of first cousins among elementary school children, for general intelligence, and obtained a correlation coefficient of .22. These resemblances are considerably less than those obtained for siblings. The conclusion to be drawn from them is that "there is between first cousins a positive though slight family resemblance in the matter of mental ability."

Thus the few results of mental tests at present available, made on the population at large, bear out Galton's belief that family resemblances in mentality exist innately, and are greatest in the closest degrees of kinship. The coefficients of correlation for twins hover around .80; those for siblings who are not twins, around .50; those for first cousins, around .25. Of all kinships, that between twins is closest, according to mental tests so far made.

IV. SIBLINGS OF THE GIFTED

In his pioneer work on family resemblance, Galton knew no means of measuring mental traits, but means of measuring physical traits were, of course, current in his day. Studying measurements of stature, Galton concluded that fraternal resemblance is the closest of all. Even the parent-child resemblance is decidedly less than fraternal resemblance. To find another relationship as close as that between offspring of the same parents, it is necessary to create fictitious persons, whom Galton called "mid-parents," by taking a point midway between parents' statures.

Perhaps the same conditions will be proved to prevail in the case of mental traits. At any rate, it will be of interest to consider here what knowledge has been gained from the few instances in which mental tests have been applied to the siblings of gifted children. Cobb and Hollingworth tested the living siblings of a group of 57 children, who had previously been selected as testing at or above 135 IQ. The range of IQ in this gifted group was from 135 to 190, with a mean at 154. Among those children who had living siblings the range of IQ was from 135 to 188, with a mean at 155. The siblings yielded IQ's ranging from 96 to 173, with a mean at 129. It is thus apparent that the siblings of the gifted tend strongly to be gifted also, for nearly all of them test above 100 IQ. Brothers and sisters of children in the highest percentile for intellect grade, therefore, almost without exception, in the higher half of all intellects. This is seen to be a remarkable record of family resemblance, when we recall that the siblings of unselected children will distribute equally throughout the lower and the higher halves of the distribution.

To sift their evidence further, Cobb and Hollingworth computed separately the mean IQ for siblings of children themselves testing above 150 IQ, and for those of children testing

from 135 to 150 IQ. The mean for younger siblings of the higher group was 132.8; for those belonging to the lower group it was 124.0. A considerable difference in the same direction occurred among the older siblings of the two groups, who, being adult, were tested by Army Alpha. The adult siblings of children above 150 IQ yielded a mean score in points of 156.7; those of children between 135 and 150 IQ yielded a mean score of 134.8.

It is difficult to see how there may be an interpretation of these differences, other than that they are due to biological heredity. The facts are easily explained by the facts of heredity, but it is hard to see how they could result logically from environmental influences. If home environment and the influence of parents were the sources of resemblance, why should two children subject to the same influence of this character test one at 110 IQ and the other at 170 IQ? Why should not all the children in one home environment test equally high? Why should siblings continue to maintain the same relative intellectual positions, year after year, in face of longer and longer continued similar pressures of environment?

Gifted children, however, do not have many siblings. Of fifty-seven children included in the gifted group studied by Cobb and Hollingworth, eighteen were "only" children. The group as a whole, at the median birthday age of 10 years 4 months, averaged not quite one sibling each. About two-thirds of the families involved were complete at this time, according to the criterion of the elapse of nine years since the birth of a child. The contrast with the preceding generation in this respect is striking, as the records show aunts and uncles of these children to be about five times as frequent as siblings. An extreme illustration is that of a boy, of IQ 190 (see child C, Chapter IX), who had no siblings, but had thirteen maternal, and fourteen paternal aunts and uncles.

Terman found the average number of offspring produced by parents of gifted children in California to be 2.53. This approximates the finding above cited. The restricted birth-rate in such families is, therefore, not peculiar to any one locality. Although the children born into these families are few, they are highly viable, the mortality rate being not over three or four per cent among the siblings of ten-year-olds.

The question has been raised from time to time, as to whether there is any correlation between order of birth and mental quality among siblings. It has in one instance been reported that first-born children have a slightly lower mean IQ than the later born. This finding is probably, however, due merely to an imperfection of method, namely to the fact that the scales used will not give a complete measure of children above 120 IQ, as they grow older; and at any time, first born are, of course, older than second-born children. Among the 57 children testing above 135 IQ, studied by Cobb and Hollingworth, more than half were first born, including the 18 who were "only" children. Terman found a proportion greater than chance would allow of first born, among the gifted in California. Nearly three-fifths of his subjects were first born, in families having two children. Cattell found about the same disproportion of first born among men of science.

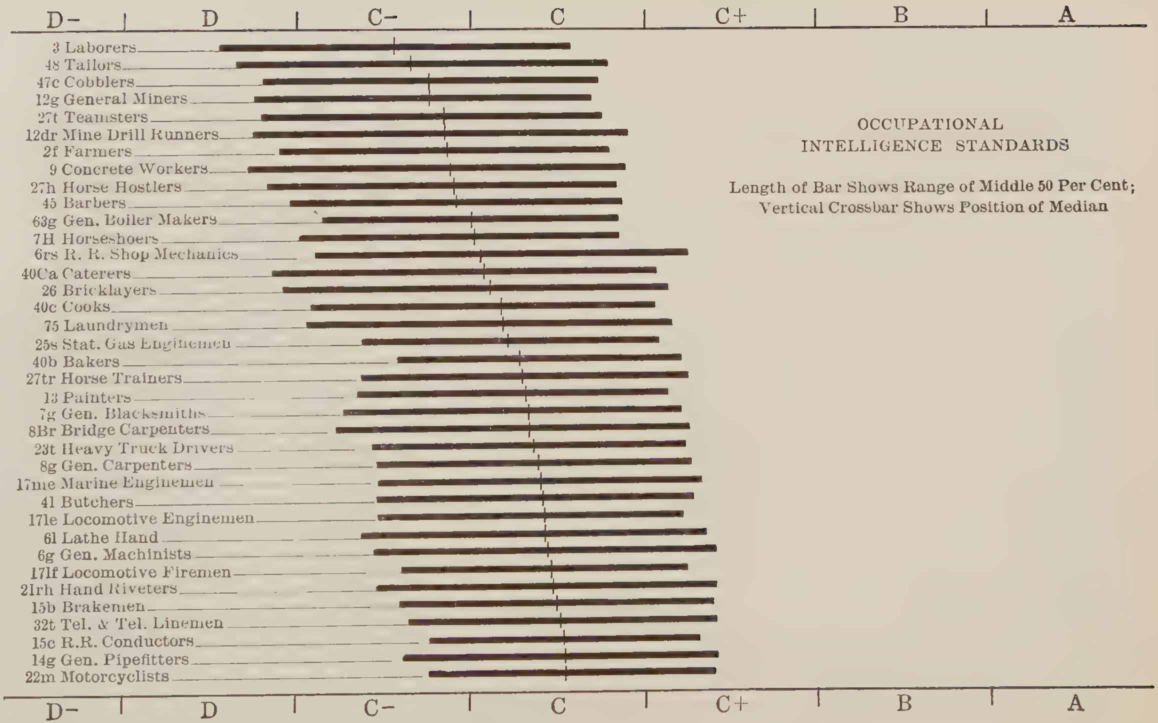
V. PARENTS OF THE GIFTED

Mental tests of the parents of gifted children have not as yet been obtained to an extent that would justify any conclusions on such a basis. Cobb and Hollingworth made tests by means of Army Alpha, on twenty parents of the gifted group whose siblings they studied. The median of these parents' scores was 142 points, which is about the median score of college seniors in this country, although only a few of those tested had ever gone to college. Their education was, never-

theless, above the average for their generation, many having gone to high school. No generalization can be made from this fragment of evidence, not only because the numbers tested are so small, but because it is almost certain that they do not fairly represent the parents of the gifted on the whole. The twenty who voluntarily responded to the request of the investigators, cannot be assumed to be a random sample of the total one hundred and nine living parents. Probably the twenty yield a somewhat too favorable intellectual sample.

Parents of the gifted can be appraised at present only by their performance in the tests which life administers daily to us all, response to which is complicated by factors other than intelligence. Nevertheless, we know that occupational status, especially if it is high, is a fairly good indication of intellectual endowment. Tests of intelligence given to large samples of various occupational groups, within the past five years, have taught us that certain degrees of intellect preponderate in each group, with fairly well-defined minimal degrees. The learned professions draw upon intelligence of a high order; semi-professional and clerical occupations come next; then skilled trades; and finally semi-skilled and unskilled labor. Figure 25 illustrates these facts graphically.

In Chapter III we have already called attention to the fact that fathers of gifted children in this country are largely professional men or proprietors. More than fifty per cent of all children testing above 140 IQ have fathers in these occupational groups, in the United States where social-economic competition is relatively free for all. More than half of the remainder have fathers in the semi-professional and clerical occupations. About ten per cent have fathers in the skilled trades, while fathers in unskilled labor and domestic service furnish only about one per cent. The occupational group which is least numerous, the professions, furnishes by far the


D−
D
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B
A
3 Laborers
48 Tailors
47c Cobblers
12g General Miners
27t Teamsters
12dr Mine Drill Runners
2f Farmers
9 Concrete Workers
27h Horse Hostlers
45 Barbers
63g Gen. Boiler Makers
7H Horseshoers
6rs R. R. Shop Mechanics
40Ca Caterers
26 Bricklayers
40c Cooks
75 Laundrymen
25s Stat. Gas Enginemen
40b Bakers
27tr Horse Trainers
13 Painters
7g Gen. Blacksmiths
8Br Bridge Carpenters
23t Heavy Truck Drivers
8g Gen. Carpenters
17me Marine Enginemen
41 Butchers
17le Locomotive Enginemen
61 Lathe Hand
6g Gen. Machinists
17lf Locomotive Firemen
21rh Hand Riveters
15b Brakemen
32t Tel. & Tel. Linemen
15c R.R. Conductors
14g Gen. Pipefitters
22m Motorcyclists
OCCUPATIONAL
INTELLIGENCE STANDARDS
Length of Bar Shows Range of Middle 50 Per Cent;
Vertical Crossbar Shows Position of Median

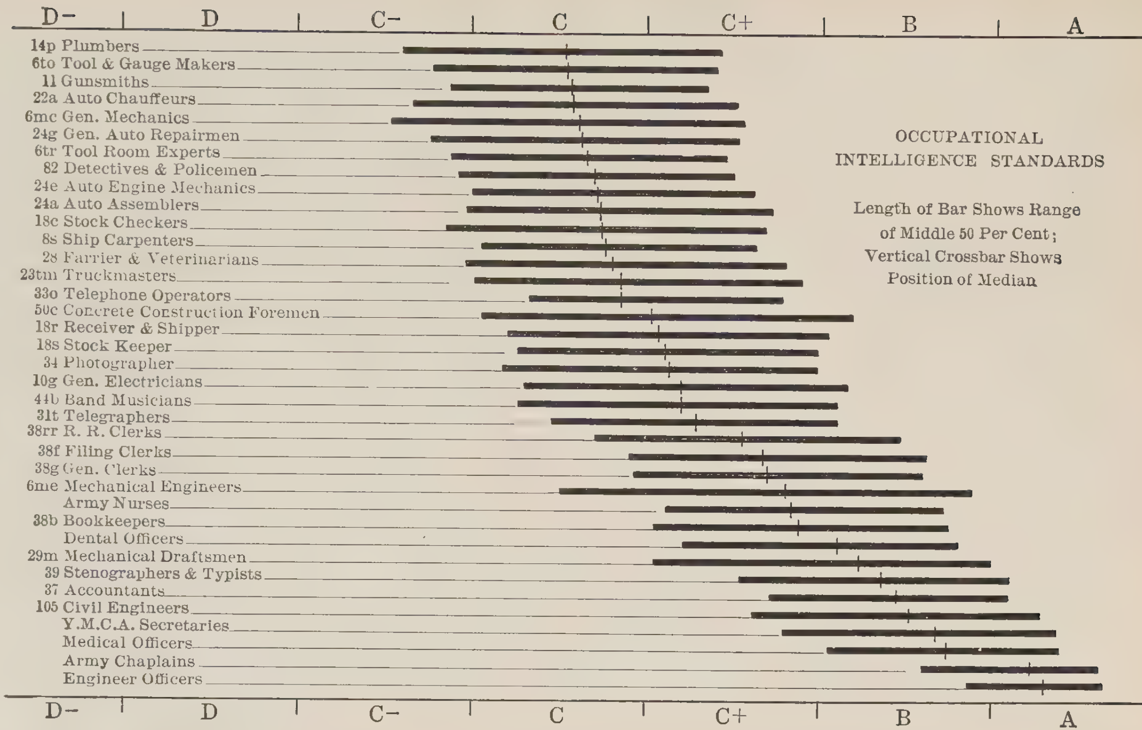

Fig. 25. — Showing how occupational groups in the United States differ in response to tests of intelligence. Note the wide differences in central tendency, but note also the overlapping in range of intelligence among occupations. (Reproduced by courtesy of The Surgeon General's Office, Washington, D. C., United States of America.)

greatest proportion of gifted offspring, while the groups which are most numerous in the population furnish very few. This result is exactly analogous to the results of De Candolle, Odin, Cattell, Visher, and others, in which they ascertained the social-economic status of eminent persons' fathers.

Men following the occupations which rank highest in intellectual requirements, according to intelligence tests, are by far most likely to be fathers of the children who test above 140 IQ. However, if intelligence is hereditary, we shall expect to find a few fathers of gifted children in the lower occupational groups, for the *overlapping* of intelligence among groups gives some "A" men in every one of them. Even in unskilled labor, an "A" man will occasionally be retained. These men of superior intelligence, but of lowly occupation, may father children gifted intellectually.

There are additional reasons why we may expect to find an occasional gifted child among fathers who have not risen on the occupational scale. Intelligence is inherited from mothers in the same way as from fathers, and the correlation between mothers and fathers in the matter of intelligence falls far from perfect unity, although it is positive. A wife may differ markedly from her husband intellectually, and this difference may be in the direction of superiority. A highly intelligent woman occasionally marries a mediocre man. Now, the social-economic status of a family is almost inevitably determined by the occupation of which the father is capable, regardless of the capabilities of the mother. But the mental endowment of offspring is as likely to be derived from the latter as from the former. Discrepancy between the intelligence ratings of the parents is not infrequently the explanation of discrepancy between the child and the father. This works, of course, both ways, and often explains also why a gifted man's children "do not amount to anything."

The impossibility of grading mothers occupationally, or in any other way that would indicate intellectual status, has led to ignoring the rôle of mothers in the study of eminent adults and of gifted children. Fathers only have been statistically studied as to achievement, for wives and mothers can neither succeed nor fail intellectually, by any recognized criteria of performance. The method of mental tests will enable psychologists to study the caliber of mothers as well as of fathers, the only difficulty being that of persuading adults of either sex to volunteer for mental tests.

Furthermore, a child may resemble an ancestor, either maternal or paternal, more remote than his parents. It is within the bounds of biological possibility, that he may resemble a grandparent, or even a collateral relative, more closely than he resembles either parent. These phenomena arise from the principles of heredity, which we shall examine subsequently in some detail.

The educational equipment of parents of gifted children is far above the average of their generation, both for fathers and for mothers. In the majority of cases where the gifted child has been born since 1915, both parents are graduates of high school, and in far more cases than in the population at large both parents are college graduates. The grandparents, too, as a group, show superior education for their day.

The age of parents at the birth of offspring has been thought to influence the qualities of the latter. The few statistical studies of the matter which have been offered all suffer from fallacies of selection, so that they cannot be interpreted. Children born exceptionally early or exceptionally late in the lives of their parents are likely to show exceptional qualities, not because the age of parents has an influence, but because parents who are exceptional in regard to reproduction are likely to be constitutionally exceptional, physically or mentally.

For instance, it has been shown that the deviation known as mongolian imbecility occurs with disproportionate frequency among children born late in the reproductive life of mothers (and by inference, of fathers). This may, but does not necessarily, mean that the age of parents is an influence tending to produce the deviation. It may be that uterine and glandular exhaustion from much child-bearing is the cause; or that persons of relatively "poor stock" continue to bear offspring as long as they can. Either of these two latter possible causes, neither of which has anything to do with age of parents as such, might result in disproportionate bearing of mongolian imbeciles by elderly mothers. Mongolian imbeciles have, in fact, been borne by mothers of every age from sixteen to beyond forty-five years.

On the other hand, it has been argued recently by Redfield, that "delayed parentage produces great men," because disproportionate numbers of the illustrious have been derived from ancestors, who procreated for generations "on the elderly side of what is normal." "The average age of one thousand fathers, grandfathers, and great-grandfathers in the pedigrees of eminent men was found to be over forty years." From these statistics it has been argued that children born when their fathers (and by inference, their mothers) are past youth, are likely to be gifted intellectually, because the life experience acquired by the parent over a long period of years is biologically transmissible to offspring.

The theory of the transmissibility of acquired characteristics is, however, not essential to an explanation of disproportionate procreation of gifted persons by the elderly. If gifted parents tend, for economic and social reasons, to defer marriage or reproduction, and if such persons are reproductive for an unusually long period, we shall expect gifted children to be born quite frequently of parents "on the elderly side of what

is normal," quite aside from questions of the transmissibility of acquired characteristics, or the influence of age. It is certainly true that those who must complete the long preparation for a career in the learned professions are by no means so likely to be married at an early age as are those who begin to earn after the fourteenth or sixteenth birthday. Moreover, it is probable that the very gifted, both men and women, are exceptionally discriminating in matrimonial choice, which would tend on the whole to delay marriage. Furthermore, the highly intelligent are best able to apply the scientific methods of family limitation in their own lives. All of these factors in the conduct of highly intelligent persons might eventuate in relatively late reproduction among them, and hence in a disproportion of gifted children born to elderly parents. Especially would this be true, if very intelligent persons, as a group, are reproductive longer than usual, as may be inferred from the statistics compiled by Kisch, already cited. The age of parents as such probably has no influence upon the qualities of offspring; but parents who can produce very gifted children (at any age) marry later, defer reproduction longer, and are probably capable of reproducing later in life than is the case with average parents. All of these factors working together, or any one of them operating, would create the illusion that the age of parents exercises a potent influence upon offspring.

It will be noted that there is no incompatibility of the suggested explanations, as to why there should be an excess, both of mongolian imbeciles and of gifted children born of parents unusually late in life. The parents of both may be constitutionally exceptional in very different respects, leading however to a similar result as regards age at which offspring are produced.

Yoder found that the age of parents at the birth of the great men whose childhood he studied varied for mothers from

eighteen to forty-four years, and for fathers from twenty-three to sixty years. The mean age of these mothers was 29.8 years, and of the fathers, 37.8 years, when the subsequently great were born. The fifty persons studied by Yoder were probably far more highly selected than the children testing above 140 IQ studied by Terman. In the case of the latter, the mean age of mothers at the birth of the gifted child was 29.01; of the fathers, 33.66 years. Seventy-five per cent of the mothers and ninety per cent of the fathers were more than 25 years old when the gifted children were born. The mean age of mothers and of fathers when children in general are born is not very reliably established. Kisch gives statistics tending to show that the most frequent age of childbearing was 32 years for mothers in Europe, during the past generation.

A study made about twenty years ago showed that very eminent men had been married at about the age for the generality. This does not hold, however, for the majority of our intellectual workers to-day. In England, where statistics have been compiled, the average age of marriage among artisans and laborers is 26 years for men and 24.5 years for women, while for the professional classes it is about 32 and 27 years, respectively. Parents of gifted children probably are considerably older at the birth of offspring, on the average, than parents of unselected children are, because of deferred marriage and other forms of behavior incident to superior intelligence and control.

A limited amount of experimental work upon the lower animals has been accomplished, to ascertain whether there is any effect of age upon quality of offspring. It has been shown that there is no measurable effect of parent's age upon the commercial value of dairy cows. On the other hand, it has been demonstrated that among unicellular organisms, which reproduce by fission, so that offspring consist of the parental

body cells, offspring differ in vitality according to age of the parents. In experimental series, all with extremely low vitality came from parents in the period of old age at conjugation, while all with very high vitality were derived from young parents.

It has for some time been evident that among human beings fecundity and intelligence have assumed an inverse ratio. The parents of the gifted now produce few children. This is unquestionably brought about by voluntary control. Cattell elicited from 461 leading men of science the information that 285 of the families thus represented were subject to voluntary limitation. "In the standardized family of two children the condition was desired six times out of seven."

As for resemblance between parents, it is highly probable that the parents of any given child will somewhat resemble each other intellectually. The degree of resemblance has not yet been ascertained by test, but that persons tend to marry each in his or her own social stratum cannot be doubted. To this fact we shall refer in detail, subsequently.

VI. RELATIVES OF THE GIFTED BEYOND THE FIRST DEGREE

Relatives beyond the first degree of kinship to gifted children have never been systematically or extensively tested for intelligence. Cobb and Hollingworth tested thirty of the two hundred first cousins related to the group of fifty-seven gifted children previously described in this chapter. The mean of these tested cousins fell at 127 IQ. Undoubtedly they do not fairly represent the total group.

The testing of remote kin offers a field of great interest, but of many administrative difficulties. The latter arise in attempts to persuade people who have no intrinsic interest in the matter, to give time and effort to it. For instance, the adult second cousin, living in Nevada, of a gifted child, living

in New York, with whom he is totally unacquainted, does not comprehend why he should submit to mental tests because of his connection with the latter. To obtain results from an unselected group of remote relatives requires great energy, patience, and skill.

Galton believed that resemblance ceases with about the fourth degree of kinship. Whether this is so can be established only by the method of mental tests, as respects intellect.

VII. REGRESSION OF KIN TOWARD THE POPULAR AVERAGE

Somewhere in the remote degrees of kinship resemblance certainly becomes zero. Even relatives of the first degree, siblings, and parents of very exceptional individuals are markedly less exceptional than the latter. It is a principle of kinship that the unknown kin of any person, who deviates extremely from the popular average in any trait, will be less exceptional, as a group, than he is. Their mean will be nearer to the average than his status falls. We have already called attention to this fact by saying that a very gifted child is very likely to be the most gifted member of his family group. This regression of kin toward the popular average undoubtedly follows definite laws, but these have not yet been mathematically established. Nevertheless, investigators are approximating mathematical formulation.

Galton took the stature of exceptional men, and showed their brothers to be on the average two-thirds as exceptional as they. The same ratio held for "mid-parents." Fathers were found only one-third as exceptional as deviating sons, and sons only one-third as exceptional as deviating fathers (if the research started with fathers). When kinship reaches the uncle-nephew degree, the mean regression of persons related to those of exceptional stature is two-ninths; that is, the unknown relatives are only two-ninths as exceptional as those in the

group forming the point of departure. Cousins of persons of exceptional stature Galton found to be but two twenty-sevenths as exceptional as those forming the starting point of investigation. "Cousins are $4\frac{1}{2}$ times as remote as fathers or as sons, and 9 times as remote as brothers," in resemblance, as regards exceptional stature.

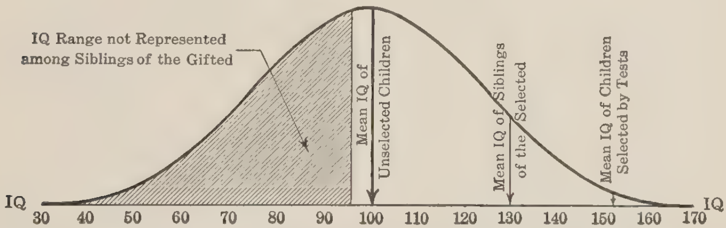

FIG. 26. — Showing how much less exceptional the siblings of gifted children are than the group originally selected, according to the data of Cobb and Hollingworth.

Referring back to the tests of siblings made by Cobb and Hollingworth, it will be seen that fraternal regression is considerable, in terms of IQ. The brothers and sisters, unknown when the investigation started, are found to be much less exceptional than the "known" group. A true regression ratio cannot be computed from IQ, since points of IQ are not, or are not known to be, true units. However, we may take as a "step" of difference a range on the distribution which includes one quarter of all cases, in a given direction (plus or minus) from the mean. This "step" is called the P.E. (probable error) of the distribution. If we utilize this measure, we find that the mean of the exceptional children's group falls about seven "steps" from 100 IQ, while that of their siblings falls only between three and four "steps" from 100 IQ, in the same direction. The latter are a little less than four-sevenths as exceptional as the selected group, in terms of the distribution for all children. This is a surprisingly close approximation to what Galton found for stature. The graph in Figure 26

shows how the siblings fall back toward mediocrity, as compared with the original "known" group.

Much further quantitative research of this kind will be required before the amount of regression can be stated for various traits and for various degrees of kinship. In order to make exact statements, it would obviously be necessary to include one hundred per cent of all kin who are in a given category of investigation. This is almost never possible, because some of them will have died, and some will refuse to cooperate. However, with industry and patience it will be possible to approximate the formulæ involved.

Galton explained the fact that an exceptional person's brothers and sisters (or other relatives) are not likely to be as exceptional as he is, by saying that in every individual among them there are "two different tendencies, the one to resemble the known man, and the other to resemble his race. The one tendency is to deviate from P (the popular average) as much as his brother, and the other tendency is not to deviate at all. The result is a compromise."

Modern knowledge of the probabilities according to which human capacities are distributed among the population, combined with the knowledge which Mendel gave us of the dominance and recessiveness of hereditary traits, helps us to comprehend more fully than Galton did why relatives of exceptional children should recede toward the popular average. The farther a given person deviates from the great average in any respect, the fewer are the chances that anyone else will equal or exceed his status. The probabilities are heavily in favor of approach to mediocrity, for any and all other individuals whatsoever. The exceptional child's relatives are subject to these probabilities, in the combinations of traits which they possess. The biological chances are heavily prejudiced against the occurrence of many extreme combinations among

them; so that the more intelligent a person is (that is, the less likely he is to occur at all), the less likely will kin occur who are equal or superior to him. Thus the most gifted parents have small chance to get offspring as gifted as themselves. The most gifted children have small chance to be derived from parents as gifted as they are.

Nevertheless, the factors which happen to yield such an extreme combination in the exceptional person appear *in part* also in others who originate *in part* from the same germ-plasm. So that there is always a partial resemblance among close kin. How it happens that all relatives, even siblings (except perhaps identical twins), originate *only in part* from the same germ-plasm we shall now attempt to explain.

VIII. THE PRINCIPLES OF HEREDITY

Biologists and psychologists mean by *heredity* the process whereby the traits and capacities of an organism are derived from and determined by ancestral germ-plasm. After the invention of the microscope it was discovered that every human being begins individual organic life as a result of union between two minute cells. One of these, the sperm, is supplied by the father; the other, the ovum, is supplied by the mother. These two cells carry genes, which determine all the potentialities of the individual thus conceived, from the shape of his nostril to his capacity for abstract thinking. The sperm carries traits derived from the father's ancestors, and the ovum carries those which have characterized the germ-plasm of maternal ancestors. The combinations possible in the chance union of two parental cells determine the constitution of the individual who results therefrom.

Erroneous interpretations of conception and of heredity, which were evolved by popular thinking before the day of microscopic investigation, are still current among people

generally. It is supposed that offspring are derived directly from the bone, muscle, brain, and blood of their parents, and that changes effected by artifice in the latter will have potency in determining the traits of offspring. Thus we find current in contemporaneous thought the doctrine of prenatal influences, and the doctrine of inheritance of acquired characteristics. These doctrines tend to be cherished at the expense of truth, because belief in them bestows a sense, however specious, of man's power to regulate destiny. It is satisfying to suppose that one may insure the moral nature of unborn children by reading sermons, or may give them curly hair by means of curling irons applied conscientiously to the hair of the mother during pregnancy. It is pleasant to believe that all the education and discipline being acquired by the present generation will be inherited by their offspring, who will therefore be more intelligent and good than their parents were at birth. Such theories of race improvement vaguely assume that the child's brain is derived from the parent's brain, the child's hair from the parent's hair, and so forth.

Experimental biology teaches that the brain, hair, eyes, and other organic characteristics of the child are not derived from the brain, hair, eyes, and so forth, of parents, but from the *germ-plasm*, of which these parents are merely the temporary carriers, and which is contained in spermatozoa and ova. Every sexually mature human being continues to liberate these living cells until the reproductive period of life is ended. The combination of traits contained potentially in each of the many cells is different to some extent from that in every other liberated by the same person. The blind shuffle of countless traits from different ancestors allows for inexhaustible variety of combinations in the germ-plasm of persons now alive. Some of a mother's ova carry, for instance, the hair-color of a grandmother. Others carry the hair-color of a great-

grandfather. Still others carry that of a grandfather, and so forth. The same is true of the father's spermatozoa. The chance meeting of two of these various parental cells determines for all time the hair-color of their child. Unless all ancestors on both sides have for many generations all had the same hair-color, various children of the same parents may differ in this respect; and this may happen, even if both parents have the same hair-color. A child may have the red hair of some remote ancestor, even if both his parents have brown hair, because his hair is derived, not from the hair of his parents but from the genes for hair *in the germ-plasm*, which they carry.

Conklin has expressed these facts simply and clearly thus:

> Thus the problem which faces the student of heredity has been cut in two; he no longer inquires how the body produces the germ cells, for this does not happen, but merely how the latter produce the body and other germ cells. The germ is the undeveloped organism which forms the bond between successive generations; the body is the developed organism which arises from the germ under the influence of environmental conditions. The body develops and dies in each generation; the germ-plasm is the continuous stream of living substance which connects all generations. The body nourishes and protects the germ; it is the carrier of the germ-plasm, the mortal trustee of an immortal substance.

The student of experimental biology thus understands why it is that a mediocre father may have a gifted son; why the children of the same parents are not all alike; why resemblance becomes less and less, as degrees of kinship become more and more remote. It is because human beings inherit their characteristics through both parents, from a germ-plasm which is continuous generation after generation. Children resemble their parents, not because the minds and bodies of the latter can affect them, but because those parents, too, were derived from the very germ-plasms which they carry, at the time when their parents were the carriers.

Resemblance disappears with remote degrees of kinship,

because the number of traits carried by any one cell is limited. A single cell cannot carry both curliness and straightness of hair equally, for example. By the time remote degrees of kinship have been reached, so many rival traits and capacities have entered into the germ-plasm through diverse mating that many of those originally common to the ancestry of two persons have been eliminated and supplanted by genes from other "stocks." Thus finally resemblance is reduced to zero, and biological kinship ceases.

Reduction to zero resemblance in intelligence would doubtless take place more quickly than it does, from generation to generation, if it were not for the psychological phenomenon of *selective mating*, among human beings. We have already stated that there is a positive correlation between husbands and wives as regards intellect, though the correlation is far from unity. Brimhall has shown that the women who marry men of science are likely to be derived from stock of the same general status as that which produces their husbands. The wives of men of science have half as many eminent relatives as men of science themselves have, and "a distinguished man of science is at least two hundred times as likely to have a distinguished wife, as a man of the generality." College graduates of either sex tend strongly to marry persons who resemble themselves in educational status. The parents of feebleminded children, tested by Moorrees, resembled each other strongly in intellectual caliber. Both fathers and mothers were very stupid, though the latter were more stupid than the former. In so far as people do tend to mate with those who resemble them intellectually, family resemblance in remote degrees of kinship is sustained, as regards IQ.

A known principle of heredity, therefore, is that individual organisms, which are partially derived from the same germ-plasm, resemble each other. Another principle is that no

two human organisms are ever derived from identically the same hereditary combination of traits, except occasionally by the chance that may produce identical twins or triplets from one ovum. Still another principle is that, as more and more diverse "stocks" enter into the derivation of a remote relative through successive ancestral matings, family resemblance disappears.

These principles have long been known to hold for lower animals and for plants, and for physical traits in man. From the standpoint of heredity, man is the most difficult of all organisms to study, because human beings breed so slowly and *produce* comparatively so few offspring in a generation. There have been only about sixty generations of men during the past two thousand years. Furthermore, the phase of heredity which is of special interest to psychologists, the inheritance of mental traits, has been especially difficult to study, because quantitative measures have been so hard to devise and also because people are more averse to having their mentality tested than they are to having their physical traits known.

In view of all these and other difficulties of the study of man, it will probably be a long time before we shall go far beyond knowledge of general principles into knowledge of the mathematical formulæ involved in laws of human heredity. We owe to Mendel and the biologists who have studied since his day, verifiable knowledge of some of the mathematical laws of heredity in organisms other than man. Very probably it will be found that the same laws hold for people which are being discovered to hold for plants and the lower animals.

Many of the lower animals offer much richer opportunity for the study of heredity than man offers, because they breed rapidly, produce many offspring, and are subject to experimental mating. Studies of the inheritance of intelligence in rats,

for instance, show that it is easy to produce a "dull" group and a "bright" group of rats in the second generation, by selective breeding of parents tested for ability to learn a maze. From similar studies we may hope eventually to obtain much light on the laws, according to which animal intelligence is inherited. The study of heredity, or of genetics, as it is now frequently called, is in its early infancy, but already it has established facts which are of utmost practical importance for education and for all other human institutions and endeavors.

IX. EUGENICS

Modern biology has shown that human beings cannot improve the qualities of their species, nor permanently reduce its miseries, by education, philanthropy, surgery, or legislation. Such attempts are palliative merely and leave a worse condition for the next generation to face. A philanthropy that succeeds in relieving the chronic pauperism of a thousand individuals of this generation, bequeaths at least two thousand paupers to be relieved by generations immediately following, for it has enabled a thousand organisms of pauper quality to live and breed. A surgery that brings a thousand infants to birth through pelves that are too narrow, burdens the succeeding generation with a still greater need for obstetrical surgery. The discovery of correctives for disorders of growth or of nutrition means that, in subsequent generations, facilities for such correction must be redoubled.

Realization of these principles of life has led to a eugenics movement, which, however, has not yet had much influence upon public policy or the thought of people at large. *Eugenics* signifies the art or technique of being well-born. If all persons were well-born in mind and body, many of the miseries that afflict the species would automatically disappear. Eugenics teaches that this might ultimately be accomplished, if human

beings could be reproduced for generations only from those who combine desirable qualities in the highest degree. By selective breeding we might eventually have a world in which the chronic diseases that afflict mankind would be no more; in which murder and theft would be unknown; and in which every person could earn a good living, and could assimilate a college education. This plan, however, is recognized as Utopian, for the species is not socially or psychologically constituted to carry it through. Only the very intelligent and altruistic minority will understand such propositions as that the earth might be saved by rational means from over-population; and that in this process of limitation it would ultimately reduce misery if the stupid, the criminal, and other mentally, physically, and morally deficient would refrain from reproduction. Those whom it is thought highly eugenic to eliminate through lack of offspring are the very ones who most often cannot grasp the message, or, grasping it, are indisposed to comply with its conditions.

Eugenicists realize that "a majority of the human race cannot be expected to legislate itself out of existence," as Conklin has said. Popular legislation is, indeed, far more likely to multiply palliatives for misery and to preserve unfortunates for parenthood. Eugenicists, therefore, stress more and more the positive side of eugenics, urging that "the best" members of the species should procreate freely, in order to counteract the unfortunate biological consequences of philanthropy and if possible to raise the mean quality of the race by preponderating. The intellectually gifted are thus urged to have many children.

This appeal to the intelligent does not raise the birth-rate among them, however. Positive eugenics finds difficulty in supplying a motive that will induce intelligent persons to produce large families. Among the very intelligent, procrea-

tion becomes more and more a voluntary matter, for they are of all people best able to learn and to apply scientific knowledge of family limitation. Also, they are best able to reflect upon the conditions of human life and are most likely to require a rational basis for conduct. No doubt they find many conditions of life which seem to deprive procreation of any ultimate rationality. Gifted women, especially, are doubtless impelled to avoid child-bearing for reasons which will become clear to anyone able to give the matter serious and consecutive thought.

Eugenicists should turn their attention to a psychological study of the motives governing parents of gifted children, if they wish to increase the birth-rate among them.

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CHAPTER VIII

Special Talents

I. THE RELATIONSHIPS AMONG CAPACITIES

In explaining how a child may be classified as to general intelligence, we have stated that nearly all performances of a given person are somewhat alike in degree of proficiency attainable. In other words, a positive correlation exists among capacities. If a child is better than average in one performance, he will probably fall on the plus side of the average in any other performance undertaken. We have, however, also stated that the correlation among performances is by no means perfect. Therefore, a gifted child may be far more excellent in some capacities than in others. Such a child may even fall below the average in certain capacities, which are almost or utterly incoherent with ability in general throughout the species. These incoherent, or generally unrelated, capacities have been designated *special talents*. An intellectually gifted child may be of any status whatever in respect to one of these special talents, for they are independent of general intelligence.

A few useful facts have been discovered about these special talents aside from the fact that they are independent, though the field has not been very long nor very widely studied. We already know, for instance, that talent for music and talent for representative drawing are slightly if at all related to intellectual ability. It has been suggested by certain data that arithmetical ability and mechanical ability are in large meas-

ure independent variables. These facts and suggestions we shall consider briefly here.

The question as to why certain capacities should be thus dissociated from general intelligence has called forth interesting speculations. We do not know the answer to the question. The suggestion arises that these special talents may owe their lack of correlation with intelligence to their close involvement with special anatomical structures outside the cortex. Mental functions which depend relatively little upon equipment of eye, ear, or hand, but essentially upon the sensitivity and integrity of the cortical neurones, might be expected to show a close relationship among themselves, constituting what should properly be called intelligence. Those which depend very largely on structures outside the brain might be expected to differ widely in quality from the former. Certainly, drawing, music, and mechanical ability, for example, involve eye, ear, and muscle to a much greater extent than does abstract thinking. These, being functions of specialized anatomical structures as well as of the brain, might be expected to show specialization in performance.

II. MUSICAL TALENT

The analysis of capacity for musical performance was preceded by long studies of tone-psychology, rhythm, and pitch-discrimination. During the latest decade, however, psychologists have somewhat left aside the study of the nature of music in order to study the musical person. They have been attempting to discover how the very musical person differs from others in psychophysical equipment, and why some people are unable to produce or appreciate music.

The analysis of musical talent soon showed that a great many subsidiary functions contribute to the quality of musical performance. These have been classified as of three general

kinds: (1) *the acoustic functions*, the abilities involved in perceiving musical sounds, (2) *the motor functions*, the abilities involved in executing musical sounds, and (3) *the intellectual functions*, the abilities involved in interpreting musical compositions and in originating new ideas.

Seashore, who with his students has made the most important contributions in this field, has devised, standardized, and made available for practical purposes scales of measurement for six of the basic capacities of *musical sensitivity*. These are for pitch, intensity, time, consonance, tonal memory, and rhythm. Research is under way to bring the other elements of musical talent within the province of mental measurement. Quantitative statements about individual differences are at present confined to those sensitivities which can be tested.

It is somewhat difficult to determine just what the relationship is between musical sensitivity and general intelligence, in a group of unselected individuals, because the tests of the former which have been devised are to some extent dependent on intelligence for their execution. In order to perform them at all it is necessary to follow somewhat complicated directions, and this requires the exercise of intelligence. Seashore's tests cannot be reliably carried out with persons whose general intelligence level falls below nine to ten years. In any unselected group, therefore, those below this minimum level automatically drop out from the study.

Within the range of intellect which is sufficient for understanding and executing the directions for the tests, musical sensitivity shows no reliable correlation with general intelligence. Intellectually gifted children are distributed just as unselected children are, in sensitivity to pitch, intensity, consonance and rhythm, and in tonal memory. There is some indication that intellectually gifted children slightly excel the

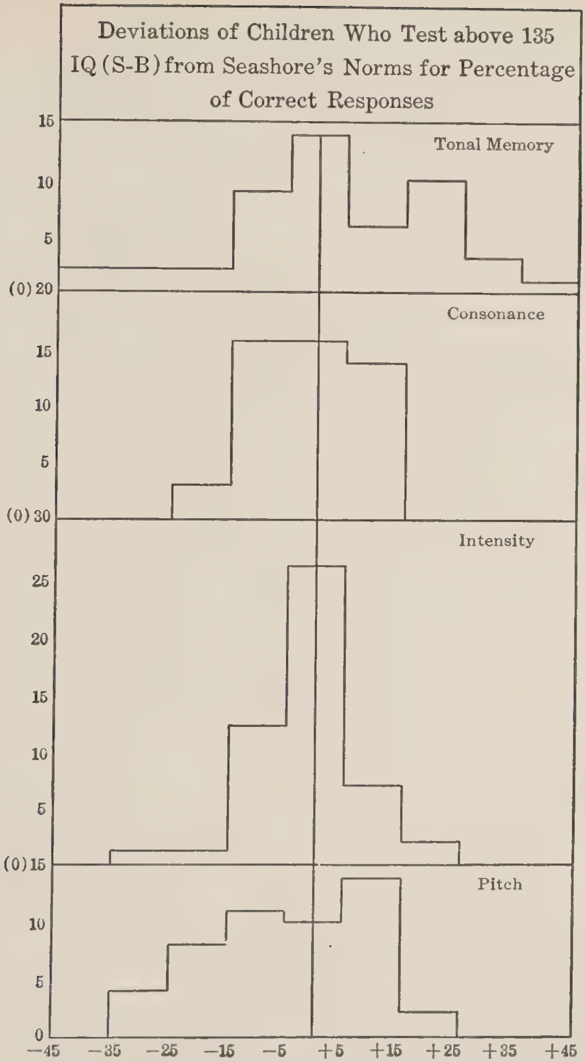


FIG. 27. — Showing that 49 school children, testing above 135 IQ, are distributed as unselected children of their age are for sense of pitch, intensity, consonance, and tonal memory, according to the Seashore Tests. (From Hollingworth's "The Musical Sensitivity of Children Who Test above 135 IQ." Reproduced by courtesy of the *Journal of Educational Psychology*.)

unselected in "sense of time," but in the other elements which can be tested they have no advantage.

Figure 27 shows how forty-nine children, nine to eleven years old, all testing above 135 IQ, were distributed in four tests of musical sensitivity, in comparison with the norms for unselected children of their age. It will be observed that they range from very poor to excellent in each test, with the greatest number at mediocrity, just as is the case with any and all samples of fifth-grade pupils.

By the method of correlation it has furthermore been shown that not only is musical sensitivity unrelated to intellect, but that the various elements of sensitivity are markedly independent of each other. A child may rate high in pitch discrimination, for example, and low in sense of time. His rating in one element does not at all reliably predict his rating in other elements. The musically gifted child is one in whom there happens to be inherited a combination of all elements in high degrees.

Individual differences in musical sensitivity are extensive, so that the musically gifted are *very* far above the average person in the special capacities involved. In some of these elements it is possible to use "times as" comparisons, because we have physical units whereby the differences may be gauged. Pitch, for instance, may be so measured. It depends physically upon the frequency of vibrations proceeding from a sounding stimulus and is measurable in terms of the constant number of double vibrations per second. Seashore has found variations in power of discrimination, from one-fourth of a double vibration to fifty double vibrations per second. This means that there exist individuals who are at least two hundred times as sensitive as others to pitch, in terms of the physical unit.

The great diversity of sensitivity to pitch may, perhaps, be

regarded as a token of the range of individual differences in musical sensitivity, especially since pitch discrimination is a fundamental capacity. It is probably no exaggeration to say that in an ordinary class in the elementary school, children are being taught together, some of whom are at least a hundred times as musical as others.

Musical sensitivity is inborn and probably cannot be increased in any respect by training. If the various elements are not present in amount and combination constituting gift for music, no course of training will supply the lack. This is not to say that ultimate achievement, for those who are gifted, does not depend upon training. Achievement arises from trained capacity.

No definition in exact terms of "a child gifted in music" has been offered. Such a child might possibly be defined as one testing in the highest one per cent of all children, for a fortunate combination of musical capacities. Just what "a fortunate combination" is remains to be defined. Undoubtedly a child testing in the highest percentile in each and every essential capacity would represent such a combination. However, it is doubtless possible to rate much lower in some of the essential capacities than in others and still have a very fortunate combination constituting a gift for music.

A small beginning has been made in the study of family resemblance in musical talent. Stanton tested relatives of musicians, and found distinct resemblances among kin. The investigator concludes that these resemblances are due to heredity. The offspring of a mating of musical with musical, of musical with unmusical, of unmusical with unmusical, may inherit through either parent, or through both parents, and apparently without regard to sex. Sex differences do not appear in any of the tests of musical sensitivity which have been standardized.

Rabbit running

Made by eleven-year-old boy of 55 IQ (S–B)

Rabbit running

Made by eleven-year-old boy of 150 IQ (S–B)

Fig. 28. — Showing, on this and the following page, comparative performance in cutting silhouettes of a child of IQ 55, gifted in drawing, and a child of IQ 150, of equal age, who has no special talent of this kind. The comparison illustrates the dissociation of this gift from general intelligence. The rabbits were cut by the two boys, working independently, from the direction, "Cut out a rabbit running." Each cut according to his own idea. The cat was cut by the boy of 150 IQ in an attempt to copy exactly the cat cut by the boy of 55 IQ.

CAT SITTING

Made by eleven-year-old boy of 55 IQ (S–B)

CAT SITTING

Made by eleven-year-old boy of 150 IQ (S–B)

Children who are so extremely gifted as to rank as "musical prodigies," show their powers at a very early age. A gifted musician may be and often is famous by the age of twenty-five years.

III. DRAWING

Various investigators, notably Ayer and Manuel, have shown that ability to represent objects by drawing is little, if at all, related to general intelligence. Children who test in the highest percentile for intellect may or may not excel in draughtsmanship. A very stupid child may surpass a very bright child in this kind of performance. In illustration of this fact we have Figure 28, which shows that it is possible for a child gifted in drawing to surpass an intellectually gifted child in this respect, even if the former is far below average in IQ.

In certain kinds of drawing, however, general intelligence is a factor. Success in these can be attained only by persons who are so fortunate as to combine a high degree of intelligence with a high degree of special talent. Analytical drawing, symbolic drawing, and caricature call for such a combination. We find, therefore, that ability in these branches of drawing is correlated with IQ, though not closely, because there are so many of the highly intelligent who lack the special gift for drawing.

As in the case of musical talent, talent for drawing is found to combine many elements. There have been various attempts to isolate these by analysis. Such analyses have noted particularly the following capacities: to notice visually and to remember forms, areas, silhouettes, spatial relations, and colors; to control and direct movements of the hand; to invent artistic combinations; to judge the beautiful; and, in case of colored drawings, to discriminate accurately among colors.

Tests of these various elementary abilities have not yet been devised, so that we cannot identify and compare the gifted, except by means of final products, like those shown in Figure 28. The large number of elementary abilities, capable of so many different combinations of amount, gives these final products marked individuality. An artist's drawing, like a signature, bears the stamp of the particular psychophysical constitution that produces it.

IV. ARITHMETICAL PRODIGIES

It is an unsettled question whether a person of low general intelligence can be highly gifted in arithmetic. That this is not likely to occur is certain, because there is a high degree of correspondence between ability in arithmetical calculation and IQ. However, the correlation is sufficiently imperfect to admit of the possibility that a lightning calculator might occur,

who would be at the same time generally stupid. Historical accounts of persons apparently so constituted have come down to us in the literature. On the other hand, there is not on record an authentic account of a dull child, with a special talent for lightning calculation. Children have been very often brought to notice by teachers or by parents, because of special excellence in arithmetic; but these children test high for IQ, when examined. A group of children, all testing above 130 IQ, is by no means distributed according to the norms, in tests of arithmetical calculation. In such tests the intellectually gifted crowd far above the average, not at the average as in tests for talent in music or in drawing.

As for mathematical ability, including ability not only to calculate, but to solve problems, think in symbolic terms, and master the principles of algebra, geometry, and other branches of mathematical science, there is no question but that it is not found in stupid persons. Between mathematical ability and IQ the correlation is extremely high. So true is this, that it is possible to predict from knowledge of IQ alone, whether a child will be able to do passable work in algebra, and other forms of higher mathematics. This is not to say that all persons of the same IQ will be equally able in mathematics, but it is to say that there is a minimum of intellectual ability, represented by IQ, below which passable work in algebra is not found. This minimum, it may be added, lies high above the average. Success in higher mathematics is not for the child of median intellectual capacity.

Historical accounts of prodigious calculators go back to ancient Greece, in references to Nikomachos of Gerase. Jedediah Buxton (b. 1702) seems to be the first such calculator on record in modern accounts. He lived at Elmton, England, and "labored hard with a spade to support a family, but seems not to have shown even usual intelligence in regard to ordinary matters of life." In 1754, when he was taken to London,

to be examined before the Royal Society, he went to see *King Richard III* performed. "During the dance he fixed his attention upon the number of steps; he attended to Mr. Garrick only to count the words he uttered. At the conclusion of the play, they asked him how he liked it. . . . He replied that such and such an actor went in and out so many times, and spoke so many words; another so many. . . . He returned to his village, and died poor and ignored." It is further stated that he could give an itemized account of all the free beer he had had from the age of twelve years.

Another person who appears to have had a very special gift for calculation is Tom Fuller, "The Virginia Calculator" (b. 1710). He came from Africa as a slave when about fourteen years old. He is first recorded as a calculator at the age of seventy, when he mentally multiplied two numbers of nine figures each, and performed other remarkable arithmetical feats. He was totally illiterate, and no evidence of high general intelligence is given in the various anecdotes about his case.

On the other hand, most of the lightning calculators of historic record have shown unmistakable evidence in their lives of superior general intelligence. Among these may be mentioned Bidder (b. 1806), Bidder, Jr. (b. 1837), Safford (b. 1836), Gauss (b. 1777), Ampère (b. 1775), Hamilton (b. 1788), and Whately (b. 1787). All were lightning calculators, who had distinguished careers in other fields. The elder Bidder became a famous engineer, and accumulated wealth. His son, the younger Bidder, was a wrangler at Cambridge University and became a barrister and Queen's counsel. Safford's interests included chemistry, botany, philosophy, geography, and history, in addition to astronomy and mathematics. He was professor of astronomy at Williams College for many years, and made many important astronomical calculations and discoveries. Gauss was one of the greatest of mathematicians.

Ampère's achievements in science have been commemorated in the ampere. He was a chemist, a metaphysician, and a mathematician. He made original discoveries in the field of electrodynamics, and was received as a member of the Academy of Sciences in Paris. Whately became Archbishop of Dublin, and had a famous ecclesiastical career. Hamilton is known as a philosopher.

There seem to be on record but three lightning calculators, who were personally examined by psychologists. Inaudi, an Italian, who earned his living by public exhibitions of his prowess in calculation, and Diamandi, a Greek grain merchant, were examined by Binet. Griffith, son of a stone mason, was examined at the age of nineteen years, by Lindley and Bryan, in the laboratory at the University of Indiana.

Binet concluded that Inaudi had no unusual ability, except for mental calculation, and that his memory for digits heard was a special gift. Diamandi, on the other hand, in addition to his ability in calculation, knew five languages, was an incessant reader, and wrote both novels and poetry. Griffith entered school at ten years of age, and attended for seven years, making a fair record in all studies. In scope and tenacity of memory, and in rapidity at calculation, he ranked with the best recorded cases, according to his examiners.

These examinations were all conducted more than twenty years ago, before standardized methods of testing had been developed. It is difficult to make a satisfactory inference as to how far the gift for calculation was specialized in these persons. All who have examined lightning calculators, or have searched their biographical records, are agreed that the secret of their power lies in highly developed mechanics. Special *habits* of combining and recognizing numbers are formed. Unusually numerous combinations are memorized, and "short cuts" are invented. Multiplication is probably utilized as the fundamental operation.

All who have studied material relating to arithmetical prodigies have especially stressed the very early age at which the gift has shown itself. This is especially true of those who as adults achieved greatness in other fields. Gauss, Whately, and Ampère were all first noted at the age of three years, and Bidder and Safford at the age of six years.

Two lightning calculators among children, known to the present writer, both test above 180 IQ. Children of extraordinary general intelligence sometimes show an ability for and an interest in mathematical processes beyond their capacities in other respects. It remains to be shown by the method of mental tests that a child otherwise not above average may show a gift for lightning calculation.

V. TALENT FOR MECHANICS

In 1915, Stenquist, Thorndike, and Trabue, working with dependent children in a county of New York State, used tests of various mental functions, including a test of ability to put simple mechanisms together. When the results of this test were correlated with the results of tests of general intelligence, a relatively low correspondence was revealed. Many who could put simple mechanisms together very well were rated comparatively low in general intelligence, while some of those ranking well in the latter could not make a good score in mechanical performance. This marked imperfection of correlation suggested that mechanical talent might be relatively specialized.

Subsequently one of these investigators, Stenquist, carried out extensive tests and standardized a measuring scale to gauge mechanical performance. Measuring individuals for general intelligence and for mechanical ability, a positive coefficient of correlation amounting to about .40 is ordinarily obtained. This relationship is very far from unity. Ability to

put mechanisms together is not reliably predictable from status in general intelligence. Nevertheless, a group of children, all testing above 130 IQ, will show a majority above the average in a test of mechanical performance. They will not be distributed according to chance, as in the cases of musical sensitivity and ability in drawing.

The experimental work of Stenquist and a few others marks a beginning of exact knowledge concerning the relationship between mechanical capacities and other capacities of the human organism. The fact that the coefficients of correlation between performance in available tests of general intelligence and performance in tests of mechanical ability are so far from unity, has led to the formulation of the hypothesis that there is a distinct kind of intelligence to be designated "mechanical intelligence." That such a distinct species of intelligence really will be demonstrated to exist is, however, improbable. The reduction from unity seen in the correlations cited is no doubt due chiefly to the participation of the motor capacities of the individual, to so great an extent, in the available tests of mechanical ingenuity. The rôle of the muscles in these tests is illustrated by the fact that a bright eight-year-old child may know what the dismembered mechanisms composing the test are, though he cannot "put them together," because his motor strength and coördination are not sufficiently developed. His fingers are not strong enough to handle the springs and levers, and his movements are not sufficiently accurate to bring them into the proper relations with each other. In fact, the tests upon which the correlations have been based, cannot be performed manually by children under 12 years of age, no matter how able they may be to tell another how it should be done. Since the correlations between physique and intellect are far from perfect, we must expect far from perfect correlations between tasks which depend largely upon

muscles, on the one hand, and tasks which depend not at all upon muscles, on the other. Such a lack of unity in performance need not imply the division of people into different categories as respects intelligence. It may imply merely that some intelligent people have relatively poor manual dexterity, while some people of excellent muscular equipment have relatively inferior intelligence (though on the whole the intelligent are more dextrous than the stupid, as the positiveness of the correlation would indicate). A person of mediocre intelligence may no doubt deal very successfully with concrete objects like mechanisms, if he be interested in them and if his hands be strong, steady, and facile. However, we are not in position, and present evidence suggests that we shall not be in position, to encourage parents of a poor thinker in the hope that their offspring "may, perhaps, turn out to be a great inventor." Inventors of machinery have not been studied psychologically, as a group, but it is probable that they rank high in abstract thinking and are not recruited from among the stupid.

VI. EDUCATIONAL PROVISION FOR CHILDREN WITH SPECIAL TALENT

Special schools for those gifted in music and in drawing have long been established privately. These usually offer scholarships to adolescents, and sometimes to children, who cannot afford to pay tuition. The public schools in this country have not until somewhat recently paid special attention to these talents. Instruction in music and in drawing, modeling, and painting has been given to all children alike, regardless, except for the personal interest of teachers, of the great individual differences in the distribution of ability. In music, for instance, all children must sing, the tone deaf along with those acutely sensitive to pitch. This undifferentiated treatment is still characteristic of our elementary schools at present.

In the secondary schools, however, there has been differentiation of curricula, so that a student who is specially talented may graduate from a fine arts course. This is true of high schools in large cities. Smaller high schools have not been able to afford such specialization.

Abroad, in Munich and in Berlin, there have been efforts to find by test the children who have talent in drawing, and to give them special training. In Berlin, when the semi-annual *Begabtenprüfung* is held to identify the intellectually gifted, a test of ability in drawing is also given. Pupils whose performance is exceptionally good are then encouraged to take training in the schools of design. The United States has in the past received design and designers from the older countries, and has not given very much attention to public education for those who are talented in this way. Whether special education in the fine arts, or in music, should be carried on at public expense is a debatable question, the answer to which cannot be attempted here.

Mechanical aptitude is recognized to some extent in the public schools of this country. Vocational schools are being established which teach the principles and management of machinery. We have the manual training high school, and the polytechnic high school. Here again, however, the public facilities are scattered and limited. Many of the well-equipped polytechnical schools are privately endowed.

VII. IMPLICATIONS AS REGARDS THE INTELLECTUALLY GIFTED

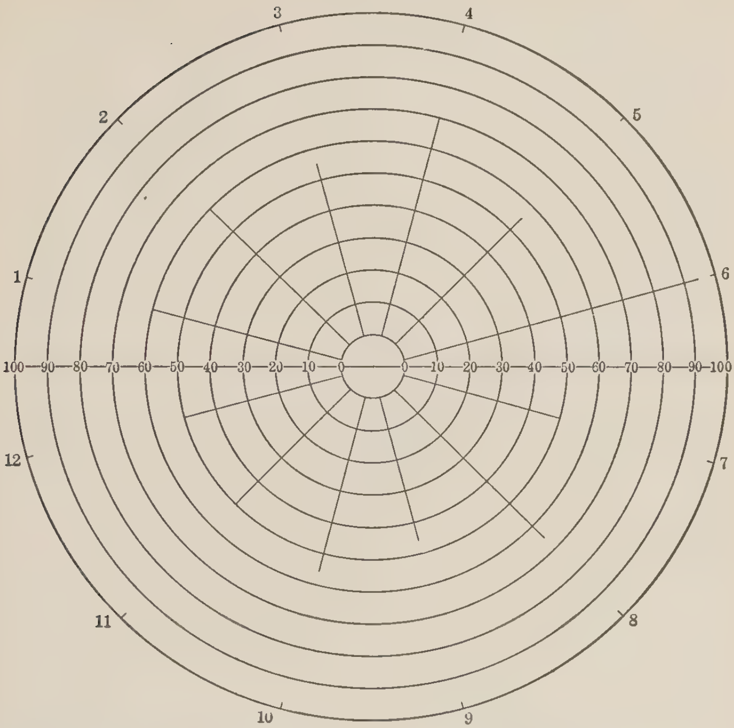
In all discussion of the intellectually gifted, with whom this volume is chiefly concerned, it must be borne in mind that they may or may not excel in these special talents. An intellectually gifted child may be deficient in music, in drawing, in mechanical manipulation. Less frequently such a child may show a special defect in reading, in spelling, in

arithmetic, or in some other mental function of importance in school work, for few single functions or groups of functions are perfectly correlated with general intelligence. A correlation even as high as .90 still leaves room for an occasional marked discrepancy. Thus, even in reading, which correlates very closely with general intelligence, occasional marked discrepancies occur. An intellectually gifted child may be deficient in reading, because the formation of habits in reading depends, for example, upon the quality of vision, as well as upon the quality of the cortical neurones. In such cases, the specialized defect may be mistaken for general stupidity. The differentiation may, however, be made by means of mental tests.

When a child combines intellectual superiority with a special talent of high degree, there exists the basis for eminent achievement in the special field. The great musician is probably he who combines intellect with great musical talent. The great artist is probably he who combines intellect with special talent in the representative arts. The great inventor is probably he who combines intellect with exceptional mechanical aptitude. Greatness in all these fields would seem to call for selective thinking, for power of sustained effort toward remote goals, and for insight into life situations in degrees of which only the intellectually gifted are capable.

VIII. THE PSYCHOGRAPH

Because abilities are thus imperfectly correlated, a complete, analytical picture of personality cannot be conveyed by such a term as IQ, or by any summary statement of general intelligence. Therefore, the psychographic method of describing individuality is being formulated. By this method the percentile rating of the person under consideration is stated for various kinds of capacity, separately. As we gradually



1. General Intelligence (Stanford-Binet)
2. Completion Test (Trabue)
3. Cancellation } (Pintner)
4. Digit-Symbol } (Pintner)
5. Opposites } (Pintner)
6. Mechanical Ability (Stenquist)
7. Tonal Memory } (Seashore)
8. Pitch } (Seashore)
9. Time } (Seashore)
10. Intensity } (Seashore)
11. Pictorial Completion (Healy)
12. Grip in Hand (Smedley)

FIG. 29. — Psychograph of a boy, showing extent of various capacities, as measured by tests, and general tendency to approach similar limits in all tests. The traits measured, and indicated by numbers on the psychograph, are enumerated above. Scores are in terms of percentile status.

learn what capacities are most closely correlated with success in various endeavors of practical life, the psychographic method of examination will become more and more highly developed. At present its claims to usefulness are tentative,

as not many tests other than those for general intelligence have been standardized.

In Figure 29 is presented one form of graph, which has been proposed to give a summary picture of individuality. Each "spoke on the wheel of capacities" represents a percentile distribution for the whole population of an age, from zero to one hundred. On this distribution, the place of the person being examined is to be indicated by the length of the "spoke" standing for the trait in question. Thus a "spoke" extending just half way to the perimeter of the circle (to the fiftieth percentile), would indicate that the person shows just the average capacity of the general population in that trait. Suppose, for instance, that the person tested for pitch discrimination has exactly average power in that respect. His "spoke" representing pitch discrimination will extend just to the middle of the distribution, which is designated fifty on the scale.

The psychograph of the individual pictured in Figure 29 is typical, in that the "spokes" representing the various capacities are of unequal length. It is typical, also, in that there is, nevertheless, a marked tendency for the various "spokes" to extend to approximately the same degree in nearly all the traits measured. In only one or two respects is there a conspicuous deviation from the general tendency (or from the *general intelligence*, if we prefer), of the individual under consideration.

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CHAPTER IX

Children Who Test above 180 IQ (Stanford-Binet)

I. FREQUENCY OF OCCURRENCE

It is interesting to inquire what the biological limits of variation are, as respects human intelligence. How far superior to the average person are the most intelligent individuals who can be produced by the human race, as it exists to-day? Our purpose in this chapter will be to consider investigations, made by direct methods, of the origin and development of children who show an extremely rare degree of intellectual superiority. For this purpose, the choice of 180 IQ (Stanford-Binet) as a minimum insures a degree of fortunate deviation very rarely found, even in metropolitan cities, as is clear from the reports of mental surveys conducted during the past fifteen years. The choice of 180 IQ, instead of 179 IQ or 181 IQ, or some other amount of IQ in the extreme upper range, is obviously arbitrary and merely defines a point at or above which children very seldom occur.

Just how often does a child testing above 180 IQ appear in our juvenile population? We cannot tell exactly until we know more about the mathematics of mental measurement. If the distribution of intellect, in terms of IQ, should be found to correspond exactly to the curve of probability as respects the frequency of cases occurring above a given extreme degree of deviation, then not more than one child in a million is so gifted as to test above 180 IQ. However, in the lesser degrees of high IQ the frequency is somewhat greater than would be

expected theoretically; so that it is probably true that children who test above 180 IQ do actually occur in our juvenile population a little more frequently than one time in a million. This does not mean that intellect, when finally it shall be measured in true units, may not conform in extent to the mathematics of chance. It means simply that *in terms of IQ* (which is in terms of ratio and not of units) the conformity is probably not exact, as respects extreme deviates.

There may be one, or two, or three children among every million children born in the United States under present biological conditions, who test at or above 180 IQ. In any case they are extremely rare, and the study of their origin and development is of correspondingly great interest. In the course of discovering six hundred and forty-three children testing above 140 IQ, Terman found fifteen who tested at or above 180 IQ. Thus between two and three per cent of the gifted group reached the status of which we are now speaking; while the group of gifted as a whole represents less than one-half of one per cent of the total juvenile population from which they were derived. From these proportions may be seen how few are the children testing at or above 180 IQ.

II. CHILDREN WHO TEST ABOVE 180 IQ BY BINET-SIMON TESTS

Because the results from Stanford-Binet tests have been proved to hold remarkably constant, we have confined our interest primarily to children tested by this means. However, a few cases of similar status were reported in the older literature of this subject, before the original Binet-Simon tests were revised. These cases are worthy of note, although their chief value has been lost through failure on the part of the investigators to report them subsequently.

In 1914, Bush reported the mental examination of his daughter, B., who at the age of 3 years 6 months tested at 6 years

by the Binet tests of 1911. This report was made to prove that the Binet tests were too easy, as no child could possibly be so far advanced mentally. "B.'s state is in nowise extra-normal, or beyond what it should be. She represents the norm." Additional data concerning B. are that she is "of a happy disposition . . . strong and well of body," and that her parents are both teachers. Her IQ would be about 185, as calculated from her father's detailed record. This record clearly shows a child of extremely exceptional intelligence, contrary to the father's belief that "she represents the norm."

In 1915, Langenbeck contributed observations of a five-year-old girl, Elizabeth, who tested at a mental level of about 11 years, by the Binet-Simon tests of 1911 given in the Johns Hopkins laboratory. Elizabeth is described as an only child, without brothers or sisters. At five years of age she had a speaking vocabulary of 6837 words, which are given in the record. At sixteen months, she had a speaking vocabulary of 229 words, some English and some German, as she had a German nurse. The investigator writes of her as follows:

> Her quickness of thought and readiness with an instant and convincing answer were typified one dusty, blustering day when we were out walking. A cloud of dust enveloped us, to her great indignation, and being a very vehement character she exclaimed, "I should like to kill the dust!" In answer to my reproof, "Do not be so foolish. How can anyone kill the dust?" she replied, "Very easily — pour a little water on it." This was at the age of four years. . . . She is highly imaginative, and lives largely in a dream world of her own creation. Her games are nearly all pretense that she is someone else, and that she is surrounded by companions, sometimes purely fictitious, though often characters out of books that have been read to her. . . . When being read to, she asks the meaning of every unfamiliar word, and rarely forgets it, using it thereafter in its proper place. . . . Many of her forbears have been distinguished men and women, and on both sides her family have been people of more than average capacity and cultivation. . . . From an early age she has shown unusual muscular coördination, using her fingers daintily and with precision. From her eighth month she used a paper and pencil, drawing recognizable figures. At four years she could illustrate a little story composed by herself. . . . The source of much of her knowledge

is a mystery to her parents, and can only be explained by her keen observation and retentive memory, as well as by a power of comprehension much beyond her years. However absorbed she may appear to be in her play, talking vigorously to herself and to imaginary companions all the time, she nevertheless hears everything that is said in her presence, though months will often pass before she alludes to it. . . . She taught herself her letters from street signs and books, and could print them all before she was three, and during the next few months would write letters of several pages, of her own composition, having the words, of course, spelled for her. . . . She has an accurate ear and could sing a tune correctly before her second birthday, and dances in excellent time. . . . Every new thought or impression is at once associated with some previous idea. Hence, doubtless, her marvelous memory. For example, in a country walk she noticed a typical Virginia snake fence and wished to call attention to it, but knew no specific name, having never seen one before. After a single moment's hesitation she said, "You see that M or W fence." . . . At the age of five years, she had coined twenty-three words, *e.g.*, *laten*, to make late; *neaten*, to make neat; *plak*, to pretend; *up-jar*, pitcher.

In 1917, Rusk published an account of a Scotch boy, whose IQ calculated from Rusk's detailed record was about 166 on first test, and about 200 on second test, two and a half years later, the Binet-Simon tests of 1911 being used. This child was the son of a widow in Dundee, who lived by letting rooms to lodgers. He had one brother, who was not thought to be remarkably intelligent. Details of family history are not given. The boy was brought to attention at the age of five by his teachers, who noticed particularly his aptitude for mathematics. The mother was unaware of her son's unusual intelligence, but she had observed that he spent a considerable amount of time on the floor, counting such things as cigarette cards begged from the lodgers, and that he "had learned before going to school, or being taught to read, to recognize certain words."

III. BETTY FORD

Betty Ford was described by Terman and Fenton, in 1921. She was born in San Francisco, January 21, 1912, and was first tested six weeks before her eighth birthday, yielding then

a mental age of 14 years 10 months, and an IQ of 188. Her speaking vocabulary was at that time about thirteen thousand words. A variety of mental tests gave nearly the same composite result as Stanford-Binet. The child at that time had never attended school, but had been given a little private instruction at home. Her scores on standard tests of scholastic knowledge ranged, nevertheless, from fifth-grade norms (in the four fundamental processes of arithmetic) to second year of college (in tests of poetic appreciation). Her median score in eight scholastic tests was about eighth grade (where the median birthday age of pupils is fourteen years).

The child's four grandparents were of Swedish, German-French, English, and Scotch descent, respectively. No especially remarkable achievement was discovered among relatives. "The mother is a woman of more than average intelligence, and of considerable musical ability. The father is a physician, and the author of the 'Ford Stitch,' favorably mentioned in standard texts on surgery." Betty is an only child.

Ratings for traits of character and of physique gave this child a score much better than average in both respects. She weighed 11 pounds and 15 ounces at birth, and at the age of 8 years 2 months, corresponded to the standard for 10 years 6 months in height, and to that for 9 years 6 months in weight, while her grip was equal to that of the average 10-year-old. She began to walk at 7 months of age; at 19 months talked clearly and knew the alphabet; at 20 months could put puzzle block pictures together; and at the age of 4 years 6 months was discovered reading *Heidi*, a book of about fourth-grade difficulty. Her parents do not know how or when she learned to read. By her eighth birthday she had read approximately seven hundred books, many of them twice. At that age it was one of her favorite pastimes to write stories or

poems and to illustrate them with original drawings. Her health was said by her parents to be excellent. The measurements given above show her to be large and strong for her age.

IV. ROOT'S CASE, VIII A

In 1921, Root described a boy, who at the age of 8 years 0 month, scored a mental age of 16 years 0 month, with an IQ of 200 (Stanford-Binet). Other tests agreed in placing this boy near an average adult level of ability in thinking. The child was 4 feet tall and weighed 50 pounds. He is characterized by Root as "somewhat anaemic appearing (very slight)," although his measurements correspond to the American norms for children of his age. His parents reported that he had never been sick, but it is to be considered in this connection that the family religion was Christian Science. Several faulty traits of character are mentioned, as "somewhat irascible," "not particularly agreeable in manner," "certain resentful attitude," "highly individualistic and petulant."

This boy too is an only child, of "mixed American" descent, English blood predominating. The father and mother are high school graduates, the father's occupation being that of railroad engineer. The maternal aunts hold prominent positions in the public schools, and one of the aunts has guided the child's education. A letter from this aunt may be cited in part, to indicate the child's problems of education.

At the age of three he learned his letters, untaught by anyone, apparently, and was spelling words. It was felt that this would interfere with his learning to read later on, so he was taught to read by the phonic method. This was done with no more time and personal attention than any first grade teacher, with ordinary number of pupils, could give to each one, provided she were generously supplied with different books, and not limited to one or two sets — state series or otherwise. A few months after his fourth birthday he was reading with independence and

had an almost perfect power to recognize new words. His only noticed failures were such foreign words as "Chevrolet" seen on billboards, and unusual words like "aisle," which he pronounced "alicie." His ease in reading was, of course, made possible, or at least greatly facilitated, by the fact that an effort had always been made to use an extended vocabulary in talking to him. Even at two, he would surprise acquaintances and strangers with expressions which meant no greater effort to him than a child's baby talk; such as, "Oh, the spider has attached his web to the board."

This ability to read opened a new world, for he read car signs, billboards, newspapers, magazines, and books. His books and magazines were carefully selected. His access to newspapers, especially the funny sheets, had the most questionable results. But *The Child's Garden of Verses*, and others, proved a veritable dream-world — as real as the everyday one. He once asked his mother, "Does Robert Louis Stevenson know when I am naughty?" At another time he wrote a letter to some of the characters in a book. At the age of six, he read *The Swiss Family Robinson* and Champlin's *Cyclopaedia of Common Things* — the two books which have been and still are his favorites. Other books which he read before entering school at seven years were: *Overall Boys*, *Brownie Book*, Kipling's *Just So Stories* (read over and over for two or three years), Swift's *Gulliver's Travels*, Kingsley's *Heroes*, Aesop's *Fables*, Tolstoy's *Stories for Children*, Grimm's *Fairy Tales*, *Arabian Nights*, Barrie's *Peter Pan*, and *Peter and Wendy*.

He entered school at seven and a half years, and was put in the B1 (beginner's) class. In the two days he was kept there, he developed a distinct aversion to school, since nobody discovered he could do anything. . . . On the third day a member of the family intervened and the teacher very reluctantly allowed him to enter the second grade. She insisted that he could not do the work, as he did not know his sounds. Of course he did "know his sounds," but perhaps he refused to do such baby work although he never expressed his unwillingness at home, and seemed quite afraid of displeasing his teacher. In the second grade he was forced to sit for 20 or 25 minutes, studying a reading lesson out of a book, which he could have read through in that time. At home he was told to take some book to school, but the teacher refused to let him read in school, even *The Cyclopaedia of Common Things*. At the end of a week and a half he was in absolute rebellion, and was taken out of school. A teacher of the fourth grade who knew him was consulted and asked to examine him for proper placement. At her suggestion the principal of his school was appealed to, and he was placed in the 4A class under a most sympathetic, patient, and "understanding" teacher, who, however, left before the end of the term. In February he skipped a year, entering the 5A. In this first year at school he had thirteen teachers, including those for special subjects such as music, sloyd, nature study, etc. His previous aversion to school lessened, but he does not to-day express any great joy in attending.

V. TWINS A AND B

In 1922, Gesell reported the case of twin girls, both of IQ 183 (Stanford-Binet). Gesell was interested chiefly in the comparison of A and B as twins, and devoted himself to their measurement from that point of view. Thus many details, for instance those of family history, are omitted from the report.

A and B were born by Cæsarian section, somewhat prematurely, weighing 4.3 pounds and 5.3 pounds, respectively. Notwithstanding their premature birth, in six months A was able to rise spontaneously to a sitting posture in her mother's lap, and very soon thereafter B did likewise. At 11 months both had begun to walk, and to talk in sentences. At the age of 3 years they began the study of French, and in less than a year from that time they were reading elementary English, French, and Esperanto. At the age of 4 they could distinguish parts of speech. They entered the third grade in school at the age of 6 years, and at the time of report they had attained the seventh grade and were doing junior high school work at the age of 9 years.

They are not prigs: they are attractive, animated, sociable children, with a bubbling sense of humor. They are popular with their playmates. They can take charge of a gymnasium class in which most of the members are two to four years their seniors, and preserve excellent attention and discipline. They speak mature but not pedantic English, and they speak French with the fluency of a native. They have read the *Book of Knowledge* in its entirety in French; and a year ago embarked on Russian. They play duets on the piano, but not with rare distinction. They swim; they ride horseback; they write jingles; and they read by the hour. Their school work does not tax them; they do not worry about it; and they are far from fastidious in regard to the form of their written work.

A complete family chart of the twin sisters, A and B, would show evidence of superior endowment in the immediate ancestry on both the maternal and paternal sides. Scientific and linguistic ability of high order and physical energy are some of the traits which are found in the two immediate generations. The trait of twinning likewise has a hereditary basis in this instance, for the mother also bore two boys, twins who died in infancy.

Measurements of physique show A and B to be slightly smaller than children of their age in good private schools, but very well nourished. The children have no living brothers or sisters.

VI. ELIZABETH

A girl, Elizabeth, was reported from Erie, Pennsylvania in 1922, by Hirt. She was born January 16, 1914, and was tested June 14, 1921, aged 7 years 5 months. Her mental age was found to be 14 years 0 month, yielding an IQ of 189 (Stanford-Binet).

This child weighed 10 pounds at birth; 22 pounds at 6 months; $28\frac{1}{2}$ pounds at 12 months; and at the age of 7 years 5 months, weighed 61 pounds and was 51 inches tall. Thus superior size was consistently maintained. She cut two teeth before she was 5 months old. She was not quite a year old when she began to repeat words. Her first sentence at the age of 17 months was, "Open the door, Daddy." The parents remembered this sentence as a sudden plunge from one-word communications into sentence structure.

At the age of 7 years 4 months, Elizabeth had mumps, "the only illness she had ever had."

As for family history, Elizabeth's mother was one of a large family of children, brought by their parents from Germany. The father died soon after their arrival in America, and the mother (Elizabeth's maternal grandmother) toiled to keep her children together and to put them all through the elementary school. Elizabeth's father is of Pennsylvania German descent. He has a high school education, and attended a business college. He is a postal mail clerk.

Among Elizabeth's first toys was a set of cubical blocks with letters and numbers on four sides. One of the baby's favorite amusements was to hold up a block and point to one side after the other, for her entertainer to tell what was on the side of the block indicated. Gradually the game changed, and the baby held up the block, and pointed to the picture

called for by the entertainer. At the age of 15 months she made no mistakes in finding the animals called for, and very soon afterwards she could find the letters in the same way.

One of her first books was *The Story of the Naughty Piggies.* The child seemed never to tire of hearing the story read, and by the time she was two and a half years old, when she sat in the lap of the reader, she could turn the page at just the right place in the story. About that time the two leaves in the center of the book loosened and dropped out. The German grandma made a mistake in sewing them in, putting the second first. Elizabeth quickly discovered the mistake, and was very unhappy about it. She followed her grandmother about, asking her to fix it. The grandmother could not understand what the child meant, and finally appealed to the child's mother, who discovered what was wrong. Elizabeth was not yet three years old, and they could not believe that the child detected the difference between those two pages of the book. But after the grandmother ripped out the stitches and replaced the leaves in their proper sequence, the little girl showed unmistakable satisfaction and content.

At three and a half years of age, Elizabeth was spelling everything she saw printed and asking what the letters spelled, and she could recognize many words. At four years, she read the advertisements in the street cars, as well as everything in all the books she possessed. During all this time there was no attempt on the part of the parents to make their daughter precocious. They were pleased with her readiness to learn, but they did not look upon her as an unusual child.

In September, 1920, Elizabeth was enrolled in the first grade, in the public schools of Erie, Pennsylvania. She was then 6 years 8 months old. On her second day in school her teacher discovered that she could read anything that was placed before her. The principal put her in the second grade until she had time to investigate her case. She spent forty-two days in the second grade, during which time the principal observed her closely, and decided to place her in the fourth grade. Elizabeth had no trouble in completing that grade in the remainder of the school year, the principal giving her some special help in spelling and arithmetic.

. . . Elizabeth is not a skillful writer, as far as penmanship goes, but she seldom makes a mistake in either spelling or punctuation, and the content of her letters and compositions is superior, even for the advanced grade in which she is now working. . . . Intellectually speaking, this child takes everything to which she is exposed, and she is not satisfied unless she understands the subject fully. Unfamiliar words or terms bring from her the question, "Just what does that mean?" She has a cheery disposition, and laughs often and heartily. She is contented in any environment, because her imagination makes it as she wishes it. . . . When she is reading or studying, she becomes so engrossed that it is hard to attract her attention to anything outside her book. . . . She is slow in her written work, and she is slow and rather awkward in some of her motor coördinations.

After less than a month in the fifth grade, in September, 1921 (age 7 years 8 months), Elizabeth was promoted to the sixth grade, where she is doing superior work. In the examinations at the end of the last semester she ranked about the middle of the class, due to the fact that she is still slow in her written work. But in comprehension she easily leads the class.

Thus far nothing has been done for this exceptional child except to move her along from grade to grade five times as rapidly as the average child can go.

VII. J. M.

The history of J. M., a ten-year-old girl of IQ 190 (Stanford-Binet), was presented by Washburne, in 1924. This girl was a pupil in the public schools of Winnetka, Illinois, where the school system is operated on the plan of individual instruction and individual subject promotions. At the age of 10 years 6 months, J. M. was doing good work in the eighth grade, and would probably have been in high school if the school authorities had not checked her in the seventh grade, by giving her a greatly enriched curriculum. Her school record shows that she entered the Chicago schools in the first grade, in September, 1919. The teacher of first grade immediately discovered that she knew too much for that grade, and had her placed in the second grade. There she remained until the following April, when her family moved to Winnetka. There she entered the second grade and was promoted in June. "Her reading, tested by the Monroe and Gray tests, was up to fifth-grade standard when she reached the third grade, and had reached sixth-grade standard by December, 1920. Her progress in other school subjects was such that in September, 1921, she entered the fifth grade. Her rapid progress was halted somewhat, as she was "carrying a double language course, finishing the fourth grade and beginning the fifth-grade work simultaneously." When in May, 1922, she began the sixth-grade work, she completed it in two weeks. "June, 1922, found her, therefore, doing advanced sixth-grade reading, through with sixth-grade

spelling, almost through with sixth-grade arithmetic, and promoted to the seventh grade in language. She was then nine years old." In the course of this progress, the grade standard in penmanship was last to be achieved. The perplexities which now arose in connection with this child's education are described as follows, by Washburne.

In spite of the fact that she was so clearly ready for seventh-grade work in the fall of 1922, we hesitated about having her come from the lower grade school to our junior high school. She was smaller and younger than any of the children in the junior high, and we felt that she was already so far advanced that still more progress was perhaps undesirable. But she had formed a warm attachment for two girls a year or so older than herself, both possessed of high IQ's, and she felt that there would be nothing for her to do in the sixth grade, if we held her back. This was so obviously true that we admitted her to the junior high school with an agreement that she would remain there until she was twelve years old.

We felt that while she doubtless could do the work of the junior high school within a year, or at the most in a year and a half, since our junior high contains only the seventh and eighth grades, she ought not to go to the senior high school too young. We agreed to give her a widely enriched curriculum of electives and special courses, to keep her active and happy for three years. But it didn't work!

When she found that no effort on her part would get her through any sooner, she stopped making effort. The end of the first year (June, 1923) found her with 7th grade cooking, 7th grade art, and 7th grade pottery, all incomplete. She had taken up general science toward the end of the year, and of course had not finished it either. She had, on the other hand, completed all of the 7th grade English and arithmetic, including some advanced work; had done exceptionally well in French. In dramatics, she first had a know-it-all attitude, owing to her mother's success in amateur theatricals, but later did very good work. In social studies she had been inclined to superficiality, trusting to her quick grasp on a single reading of the material (Rugg's *Social Science Pamphlets*) and doing little real thinking. But she was interested, and finished the course within the year.

The general feeling of the teachers, and of J. M. herself . . . was that she had "loafed on the job" a good deal, had been over-confident, and had "let down" generally when the stimulus of rapid advancement was taken away. This gives us some inkling as to what would have happened to her in a regular school system, where the class lock-step is the rule. This year J. M. is taking a straight eighth-grade course with one elective, and is tying up the loose ends left undone at the end of last year.

. . . The child's strong desire to move forward with the children

who are now her friends, and the undesirable effect on her of our last year's experiment in holding her back regardless of her effort or ability to go forward, have resulted in our decision to let her graduate this coming June.

Her parents, however, have requested that we keep her in our junior high school for a post graduate year, because they feel that the influence of this school is needed by J. M. We shall, therefore, try to provide a special course for her next fall. If we find out that it does not work out successfully, we will enter her in the senior high school in February, 1925. If, on the other hand, we find that we can give her the sort of education that will be helpful to her in our junior high school and that she responds rightly, we shall hold her here until June, letting her enter the senior high school at the age of twelve and one-half years.

Interpreting and summarizing our experience with J. M.: Our system of individual instruction has permitted her to make full use of her intellectual ability. When we tried to depart from it to prevent her progress from becoming too rapid, she showed a lack of interest and in some parts of her school work she did not work up to capacity, and even became to a slight extent a discipline problem. Given, however, an incentive to first-class work and the training in social behavior which we are trying to give in our junior high school, J. M. developed successfully and well. On the whole, our system has enabled us to deal with her flexibly and as an individual. It has prevented us from prolonging our mistakes. Probably no system, or uniform plan, can be made to fit children of such exceptional mental endowments. The most we can hope for is a flexibility which will enable us to deal with such children as individuals, feeling our way as we go along.

As for family history, J. M. originates from ancestors of very superior intelligence. Her parents have both consented to take the Army Alpha test, with the result that both scored far above the generality of adults. Her father was educated as an electrical engineer, but subsequently went into investment banking. J. M.'s paternal grandfather was an architect who attended Edinburgh University, and was trained in the Manchester School of Science. The paternal great-grandfather was an architect and ship builder, who engaged in laying out factories, and came from a line of builders. The paternal grandmother was an English woman, educated by her aunt, "who had advanced ideas on what a girl should study." Her father was a dealer in building materials.

J. M.'s maternal grandfather was first a teacher, then a mer-

chant, very wealthy, and mayor of a southern town for eighteen years. The line of his descent was through southern planters. The maternal grandmother was the daughter of a college professor, who in turn was the son of a physician and surgeon, coming from a long line of physicians. The maternal grandmother's mother was descended from wealthy farmers. It is of some interest that for three generations at least J. M. and her immediate progenitors were born when the parents were thirty years of age, or older, in some cases being more than sixty years old.

At the age of 10 years 6 months, J. M. was 54.5 inches tall, and weighed 88.5 pounds. This is decidedly in excess of the standards for average children, as regards size.

VIII. E. B.

E. B. was described in 1924, by Stedman, as having "the highest IQ yet reported." Exception may be taken to this description on the ground that the test by which E. B. registered an IQ of 214 was not the first given to the child. She had been tested previously by Stanford-Binet, at the Child Welfare Research Station, in Iowa, at the age of 5 years 9 months, when she earned an IQ of 175. Being tested in the psychological department of the Los Angeles city schools, at the age of 8 years 11 months, E. B. scored a superior adult record, with an IQ of 214 (Stanford-Binet). How much the latter result is influenced by familiarity with the tests we cannot say. From the fact that the areas of testing on the two occasions scarcely overlap, as is apparent from the complete records given, it would be inferred that but slight allowance need be made for familiarity. E. B. is therefore included in our account of children who test above 180 IQ, though strictly speaking, she did not quite reach this status on first test, as the others here included did.

When 4 years 6 months old, E. B. was placed in a convent school on account of her mother's going to France. She was not enrolled as a pupil, but was permitted to sit with the high first grade when she wished, because her chum sat there. In four months, when school closed, it was discovered that she could read any page in the reader which had been used as a text, and any page in the public school first reader, which she had never seen before. Accordingly, though not yet five years old, she was promoted to the second grade.

At the close of the next school year, she was promoted to the fourth grade, aged 5 years 9 months. Before E. B. was 6 years old she had read practically every book listed by the public library at Des Moines for children of the first six grades. At the age of 9 years 4 months she was doing eighth grade and post-eighth grade work. Her favorite books at the age of 9 years include Barrie's *The Little Minister*, *Sentimental Tommy* and *Tommy and Grizel;* Hugo's *Les Misérables;* Dickens' *Oliver Twist*, *Our Mutual Friend*, and *David Copperfield;* Eliot's *Silas Marner* and *Mill on the Floss;* Bunyan's *Pilgrim's Progress;* Hutchinson's *If Winter Comes* and *This Freedom*. . . . Until she entered the opportunity room, E. B. never had a child companion, and was unpopular with children. She was friendly but shy, and unable to comply with the play standards of other children. In the opportunity room she made better social adjustments. She is cheerful, affectionate, and considerate to the point of self-denial. She obeys implicitly, but is forgetful in the commission of small duties, perhaps because engrossed with more interesting matters. She thinks along economic and political lines, and can hold her own even with many adults in conversing on these subjects. . . . Health is excellent. She has had the usual children's diseases, but has recuperated very quickly. . . . E. B. is of French, English, and Scotch descent. The father finished high school at 13, and was an A and B student at the University, taking gold medals for original composition. He is a writer and editor. . . . The paternal grandfather is a lawyer, teacher, and author. The paternal grandmother has mathematical ability. . . . E. B.'s mother entered school at 8 years, and completed high school at 15. She then entered business college, and completed the course in less than three months. She then entered college, working her way through with consistently A records. She was editor of a national magazine at 25, and at the time of investigation was an editorial writer on *Screenland*. . . . The maternal grandfather's history is unknown. It is thought that he was average; but the maternal great-grandfather was probably superior. At 21 he could neither read nor write, but just at this time a public school was established near his home. He entered, and finished the course for the entire eight grades in sixteen months.

. . . E. B.'s mother states that she first spoke words with meaning at 7 or 8 months of age, and that she walked at 10 months. When she was 3 years old, her parents discovered that she knew the alphabet, which she seems to have learned by asking questions about printed signs. She has had very little formal instruction at home, for her mother has been active in newspaper work most of the time, usually working at night.[1]

IX. CHILD E

Child E was first described in 1917, by Garrison, Burke, and Hollingworth, and again by the same observers in 1922. In this case, history subsequent to that on record is also available. E is a boy, born June 17, 1908. The occasion of first meeting with him was that a child of unusually superior intelligence was wanted for demonstration to a class of teachers, studying the psychology and treatment of exceptional children. Two of E's former teachers of the Horace Mann Kindergarten of Teachers College proposed E, and the child was accordingly brought for demonstration. He had never in his life had a mental test previously, being then 8 years 4 months old. His mental age was found to be 15 years 7 months, yielding an IQ of 187.

E has always attended private schools. Between the ages of 3 and 5 years he was in kindergarten. From 5 to 6 years of age he was out of school, on account of school organization. He was intellectually misplaced in kindergarten, and yet was restricted from going on because he was not yet 6 years old. From years 6 to 7, he attended an open-air ungraded class, and did the work of second and third grade. From years 7 to 8, he was in the fourth grade in ordinary school classes, and at his eighth birthday (June, 1916) was promoted to the sixth grade. By the spring of 1917, E, aged nine years, had finished the work of the sixth, seventh, eighth, and ninth grades. Thereafter he attended high school, and was gradu-

[1] From Stedman's *Education of Gifted Children*, Copyrighted 1924 by World Book Company, Yonkers-on-Hudson, New York.

ated in three years, with an excellent record and fourteen points of excess work credited toward college. At graduation from high school E had not quite passed his twelfth birthday.

Also before his twelfth birthday, E had passed the comprehensive examinations of the College Entrance Board for Harvard College. His maternal relatives had traditionally attended Harvard (one of them having been graduated from there at the age of 18 years, according to the records), but E expressed a desire to attend Columbia College. He received permission to take mental tests with the applicants of 1920, and was admitted to Columbia College at that time.

Just before his fifteenth birthday, E was graduated from Columbia College, having done his college work in three years. The quality of his scholarship is indicated by the fact that he took general honors and received a prize in money. He was elected to Phi Beta Kappa at the age of 14 years 9 months — probably the youngest person who ever received this honor. He entered upon postgraduate studies at the age of 15 years 4 months and took the M.A. degree when 16 years old. At present he is matriculated for the Ph. D. degree, which he will probably attain at about the age of 18 years. He plans to enter a theological seminary thereafter, as he will then be old enough to be admitted to professional study for the career of clergyman.

The accomplishment of E in terms of school and college courses by no means represents the extent of his scholarly work, or the breadth of his knowledge. From earliest years he has done work outside the regulation curriculum, especially in modern and ancient languages.

Teachers' judgments of E show the usual disagreements and confusions of interpretation. Some of his teachers have been irritated by his deviation from the usual, particularly in the

years of the elementary school, and by the suggestions of his parents that he be advanced in school. The judgments of E's kindergarten teachers is indicated by the fact that he immediately came to their minds when a child of very exceptional superiority was required. Many of his teachers in high school have expressed the most favorable opinions of E, both as to character and intellect, and they predicted a brilliant career for him in college.

E has never been interested in playing with children of his age. His diversions were never such as could be enjoyed by young children. In kindergarten, he stood aside and watched the play of the other children in a polite, impersonal manner. From about his third birthday his chief pleasure has been reading. Other favorite diversions, up to his fourteenth year, have been swimming, chess, golf, and dominoes. Previous to his ninth year, he was deeply interested in the elaboration of his "imaginary country," which he located on the planet Venus.

Subsequent to his first mental test at the age of 8 years 4 months, E has been tested twice. At the age of 12 years 0 month he was given the Thorndike mental test for college freshmen and emerged second from the highest in a class of 483 prospective freshmen (whose median birthday age was between 18 and 19 years). Again, at the age of 13 years 3 months, he was tested by means of Army Alpha and scored 194 points on one form and 201 points on another form of this test. This is near the maximum possible score on this test, which is theoretically constructed to surpass the mental powers of all adult human beings. The scores made by E are rarely equalled by adults anywhere. The median score of adult persons in our population on this test is 47 points.

Physically, E has always been very healthy and has been since birth much larger than the average individual. At

birth, according to hospital records, he weighed 7.5 pounds, the norm being 7 pounds, and he was 51 centimeters long, the norm being 51 centimeters. At eight years, he weighed 89.3 pounds and was 54.3 inches tall. At 13 years, he weighed 166 pounds and was 64.2 inches tall. He has always had a healthy appetite for food and for sleep, and all whose opinions have been solicited agree that he is very stable nervously, calm and well balanced in temperament. He has practically no medical history, never having had a severe illness. In early childhood he had measles. When 15 years old, he had a light attack of scarlet fever, and soon after recovery from this he slipped and fell, breaking his right arm, which quickly knit. These incidents constitute E's medical history.

Maternal ancestry in this case is especially notable. E's mother is living and well. Before her marriage she was a research worker in bacteriology. Her publication on the bacteriology of milk was awarded a medal at the St. Louis Exposition. She holds the following academic and professional degrees: A.B., A.M., M.D., LL.B., all from universities of high standing. She has been sent as a delegate to medical congresses in Rome and in Moscow. Since the birth of E, his mother has given up professional work, to devote herself to his education. She was 44 years old when E was born.

Fairly complete genealogical records of E's maternal ancestry are available in print. They trace back chiefly through three old New England families. Five persons bearing the surname of the mother settled in New England before 1650. These were all probably related to each other. The individual who was E's direct ancestor first appeared in New England in 1639, and settled in Cambridge, Massachusetts. This family attained great distinction in the six generations recorded in the New England genealogy, including among its members royal councillors, governors, admirals, and patrons

of learning. The branch of E's family from which his mother derives her middle name includes scientists, physicians, and many other professional people of note. For instance, one of them was a delegate to the medical convention, which formulated our national pharmacopœia.

E's father is living and well. He is a college graduate, and has always maintained a keen interest in educational affairs. He has written several books on insurance, and organized a special library of insurance, which is internationally used as a reference library. He is engaged in business in two large cities, and has served on various important commissions, where honesty and fair-dealing were especially desirable in the members. He became separated from his blood relatives before the age of recollection. Unusual mental endowment is clearly indicated by the fact that he rose entirely by his own direction and effort to a post of honor in an intricate field of knowledge. He was 45 years old when E was born.

The ancestry in the case is Scotch-English. E has been reared as an only child, though three children were born before him, all of whom died in infancy.

X. CHILD D

Child D is a boy, born March 9, 1910. He was first described by Terman, who tested him in 1917. D like E, was brought to attention by the principal of the Horace Mann Kindergarten, as being a child of remarkable endowment. He was then 7 years 4 months old, and yielded a mental age of 13 years 7 months, with an IQ of 184 (Stanford-Binet).

D is descended from Russian Jews in the paternal branch, and from English Jews in the maternal branch. The father immigrated to America at an early age. He is a high school graduate and was a student of engineering, but abandoned these studies in the third year to do newspaper work. He is

now in the advertising business in a large city. His leisure is spent in writing. He has recently published his fourth book, a philosophical drama dealing with religion. The three preceding books were novels, the first of which was published when he was 21 years of age. He was 28 years old when D was born.

D's mother went to school for only a few years. She has been largely self-taught. Before marriage she was statistician and registrar of a large philanthropic organization. She has published stories, reviews, and poems, and recently published a book on education. She has always taken part personally in the education of D. She was 26 years old when D was born.

D is an only child. Conspicuous relatives beyond the first degree of kinship include a chief rabbi of Moscow, who was exiled for aiding the nihilists, a distinguished lawyer, a man who by his own efforts became a millionaire, a concert pianiste, a composer and virtuoso, a writer, and "a relative decorated for science in Poland." The maternal great-grandfather was a famous rabbi, who compiled and published a Jewish calendar, covering a period of 414 years. This calendar contains, in regular order, the exact period of every new moon's appearance, the sabbaths, festivals with scriptural portions for each, and the equinoxes of the solar year, according to the prescribed and authorized Jewish laws, corresponding with dates in the common era. The tabulations have been carefully compiled from various works of ancient rabbinical astronomers, with annotations in Hebrew and in English.

This rabbi was also the great grandfather of the four first cousins of D, whose intelligence quotients have been taken. These cousins yielded IQ's of 156, 150, 130, and 122, respectively. A second cousin in the maternal line yielded at the age of 6 years, an IQ of 157.

D could stand, holding to chairs, at 9 months of age, and

walked alone at 11 to 12 months. He could say words at 8 months, and could talk in sentences at 11 months. In November of 1910, he said, "Little boy," when his shadow appeared on the wall. He cut his first tooth at 4 months. At the age of 18 months he learned to read, sitting in his mother's lap at the typewriter, and looking at the letters. The records kept by the mother indicate that "he learned to read and count in 1911." "October, 1911, counts all day long."

D's earliest memory goes back to 2 years of age, when he saw a rat and thought it was "a little brownie." The quality of the questions asked by D in the first 36 months of life may be exemplified by a question asked in October, 1911: "Has every door two knobs? Why?" "He was always asking unexpected questions."

This child was not placed in school at the usual age, because he did not fit into the school organization. By the time conventional kindergarten age was reached, D could read fluently, and could perform complicated arithmetical processes. His intellectual interests were far beyond even those of the highly selected children of a private kindergarten. Therefore, his parents kept him out of school and obtained the companionship of other children by sending him to a playground. Here he made contact by composing, editing, and typing a newspaper, issued at intervals, a copy of a page from which is shown in Figure 30.

In the September following his ninth birthday, D entered upon formal instruction in the junior high school, and in the autumn following his tenth birthday he entered senior high school, from which he was graduated at the age of 12 years, with a scholastic record which won for him two scholarships. He was admitted to a large Eastern college at the age of 12 years 6 months, and has made a superior record throughout. He has finished the junior year and in the normal course of

WITH THIS EDITION PLAYGROUND, KINDERGARTEN AND EUROPEAN NEWS.

******

THE WEEKLY POST

PRICE: PLAYGROUND MONEY, 2 CTS., REAL MONEY, 5 CTS. NEWS: MAR. 16TH TO EASTER 1917.

NOTICE !

**** ****

This newspaper, The Weekly Post, is, for this week only, going to cost 5 cents real money. About a month ago it cost 1 cent a copy playground money. Then I, the editor raised its price to 2 cents playground money a copy. Now it is 2 cents playground money, but, instead of it being 1 ct. real money it is 5 per copy. The reason is this:

I was told the other day by my mother, who happened to be at the playground, that Miss Rankin had told her that there was going to be a fund in the Horace Mann Kindergarten room to try to make by selling odds & ends, enough money to support a Belgian child for 1 year. Then (if I am corect) it was going to be sent over to Belgium. And Miss Rankin had been told that the students, who, visiting the playground, read my newspapers liked them so much that I had better fix up my house 'cause it was going to(likely) be taken in the kindergarten room so I could sell them at 5 cents real money each.

P.S.--It was me who thought of fixing up my house, not Miss Rankin.

LETTER FROM MISS GARRISON

****

Miss Garrison, one of the kindergarten teachers, wrote me a letter the other day concerning an old engine belonging to me which I put an article in the paper that I didn't care for and would give it away to anyone who wanted it.
The letter is:

The children of the Horace Mann Kindergarten will be pleased to have the engine mentioned by the editor of the newspaper and will take good care of it if he will give it to them.

C. G. Garrison.

FIRST LETTER

*****

The Weekly post has received the first Letter that it ever got from anyone. The editor certainly thanks Miss Garrison for it.

CHILDREN COME TO VISIT PLAYGROUND FROM LEONIA, N.J.

****

About 2 or 3 days ago when I, the editor, arived at the playground I found, as visitors to the playground, 1 or 2 or 3 ladies with at least 7 children. I was told (by one of the ladies and Miss Rankin) that these visitors had come from Leonia, N.J. to look over the playground because they were going to have a playground over in Leonia and they had come to look at this one to see what a playground is like.

JOHN ELECTED PRESIDENT OF PLAYGROUND; COUNT UNKNOWN TO EDITOR

*****

In the latest election, which took place this week, John, who won the first election, too, was for the second time elected president. He was one of the captains in the old playground war, which has now ended. The candidates were:

John
Ned
Sanderson

I think there was another, but, if there was another, I do not know his name. I do not know the number of votes the canidates had.

THE FIRST SHOT

******

The editor (or I) put an article in last week's paper entitled THE FIRST SHOT WILL MAKE IT It was about that my mother had,

(Continued on second page)

FIG. 30. — A page from a playground newspaper, issued by Child D, aged 7 years. The content was composed, organized, and typed entirely by D.

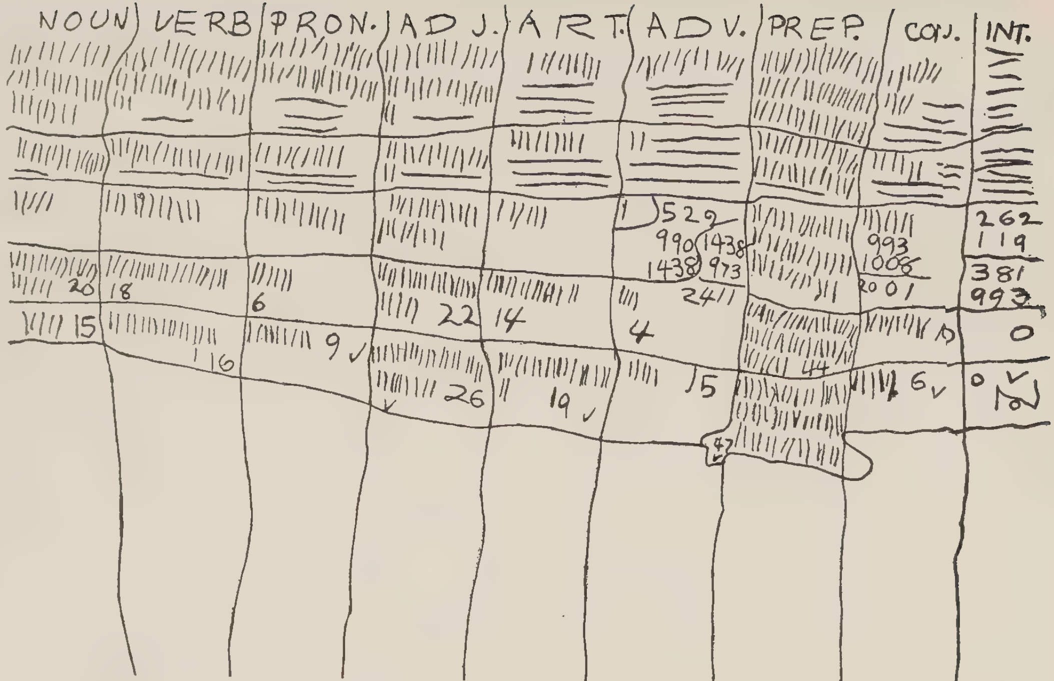

FIG. 31. — Fragment of statistical study of frequency of parts of speech occurring in his general reading, over a limited period of time. Made by Child D at the age of 8 years.

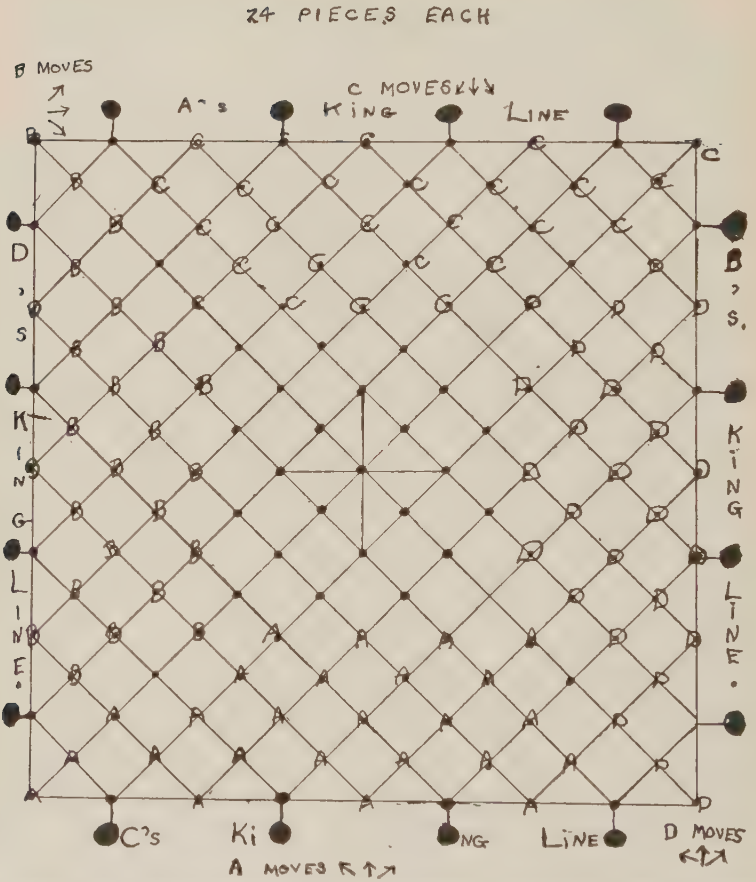

FIG. 32 (Part I). Schemata for four handed checkers. Devised by D, aged 10 years.

events will be graduated from college at the age of 16 years. He is ambitious for a career in natural science.

A large volume would be filled by illustrating all of D's creative work during his development. He has made hundreds of designs and drawings, he has created a dictionary of words composed by himself ("wordical work"), he has devised

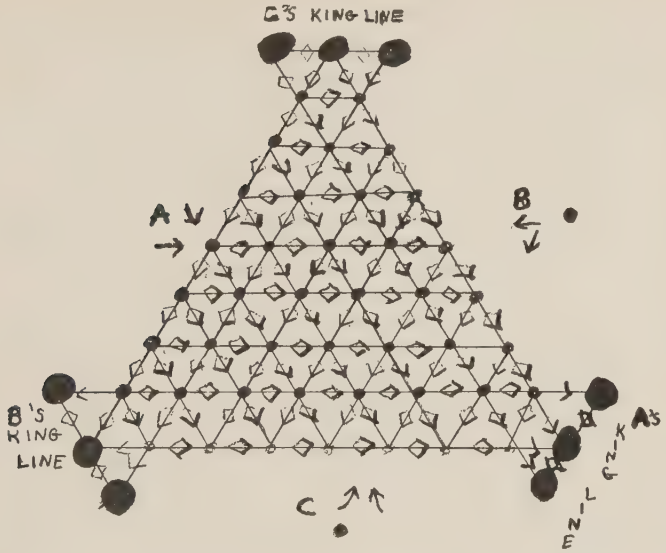

FIG. 32 (Part II). — Schemata for three-handed checkers. Devised by D, aged 10 years.

many games, done thousands of mathematical calculations, compiled statistics, written musical compositions, renamed and combined colors, composed stories and dramas, and recorded thousands of observations pertaining to natural phenomena. Figure 31 is illustrative of his early interest in grammatical construction, a fragment of a statistical study of parts of speech. This enterprise was undertaken at the age of 8 years, after reading *Grammar Land*. Figure 32 shows D's inventions of four-handed checkers and of three-handed checkers, respectively. The original chart for three-handed checkers indicates the moves for each of the three hands in colors, which are not reproduced here.

D has been rated by both parents and teachers as well above the average in character. No faulty traits have been ascribed to him. The desirable traits most often mentioned

are refusal to lie, loyalty to standards once adopted, readiness to admit just criticisms, unselfishness, and amiability. He is rated as very stable nervously. His health has always been excellent, and no physical defects are known to his parents, except that his slenderness has been rated as a defect by one examiner. That D is very tall and thin may be seen from the following measurements. At the age of 12 years 2 months, he was 64 inches tall, and weighed 76 pounds.

Since his first test of intelligence at the age of 7 years 4 months, D has had two subsequent tests. He was tested at the age of 10 years 11 months by the present writer, using Army Alpha, and scored 185 points. This score is about 30 points in excess of the median score made on this test by post-graduate students in first rate American universities. At the age of 12 years 3 months, he took the Thorndike test for college freshmen, and made a score of 106 points. The median score for college freshmen falls between 70 and 80 points. It is thus evident that there is no tendency whatever to become mediocre as maturity is approached.

D, like Child E, had an imaginary land in early childhood — "Borningtown." He spent hundreds of hours peopling Borningtown, laying out its roads, drawing maps of its terrain, composing and recording its language, and writing its history and literature.

XI. CHILD A

Child A is a boy, born June 18, 1914. His parents brought him for mental tests, on the advice of his school principal, because he was a school problem. He did not adjust himself well to the work of the classroom, in the second grade where he was then placed, at the age of 6 years 6 months. His IQ (Stanford-Binet) was found to be 187.

A is descended from German Jews, on both sides of his

family. He is of the third generation to be born in the United States. The father is a large, strong man, now following the profession of organization engineer. He is a graduate of high school and holds a professional diploma as marine engineer and architect. He has invented and patented a complete combustion furnace and has designed a set of torpedoes, which were used in the Japanese-Russian war. During the war of 1914–1918, he participated in the development of a fleet destroyer, and designed a boat superior to previous models, for transporting nitrocellulose. He made the original layout for one of the largest steel plants in the United States. His score on Army Alpha is 180 points. He was 29 years old when A was born.

A's paternal grandfather is living and well, a tailor by trade. He is "very handy" in making useful devices for his shop. The paternal grandmother is a competent housewife, who has evinced no noticeable intellectual interests. A's paternal uncle, a successful dentist, married a teacher, and has two young daughters, who have yielded IQ's of 170 and 129, respectively. These are the only first cousins A has. It is usual for the progenitors in the paternal branch to die between the ages of 80 and 100 years. There is no record of any constitutional disease in the ancestry.

A's mother was graduated from high school. Before marriage she was in business, as an executive in charge of advertising, for one of the largest drug dealers in this country. She also handled business affairs involving large sums of money for a tobacco company. At one time she did newspaper work. She was 27 years old when A was born.

Conspicuous relatives in more remote degrees are cousins who founded a famous banking house in London; a tailor, who devised and patented a union suit (said to have been the first union suit on the market) and an improved buckle for

adjusting men's vests in the back; the founder of a firm which manufactures world-famous lenses; a judge; and a leader of Jewish reform movements.

A has one brother, three years younger than himself, whose IQ has fluctuated between 145 and 161 on four annual tests.

The mother of A kept a "baby-book," from which the following data have been derived. He began to articulate words at 10 months of age, and at 14 months could pick out letters on the typewriter at command. At 12 months he could say the alphabet forward, and at 16 months could say it backward and forward. His parents had no idea he could reverse the alphabet, until one day he announced that he was "tired of saying the letters forward," and "guessed he would say them backward." The concepts of "forward" and "backward" were thus developed by the age of 16 months. At 12 months, he began to *classify* his blocks according to the shape of the letters on them, placing V A M W N and other pointed letters together, Q O G D and other letters with loops together, and so forth. Before the age of 3 years he enjoyed rhymes, and would amuse himself rhyming words. When he was old enough to be taken out to walk, he pointed with exclamations of delight and interest to the letters on billboards and signs, crying, "Oh, see D! There's J, Mother! There's K and O!" Also, before the age of 3 years, this child objected to stories containing gross absurdities. For instance, he took exception to the story of the gingham dog and the calico cat, who ate each other up. He pointed out that this could not be, "because one of their mouths would have to be eaten up first, before the other one, and no mouth would be left to eat that mouth up." He was irritated by this lapse from logic, and requested that the poem be read no more.

A learned to read for himself during the third year of life,

and read fluently before he entered school. At the age of 6 years, to the question, "What do you like to read?" A replied, "True books, like *The Fall of Jerusalem* — that's the best one — *Burgess Animal Books*, *Burgess Bird Books*, *Our First Flag*, and *Arabian Nights*." A has always preferred books of fact to books of fancy, but he developed more of a taste for fairy tales about the age of 9 years than he had previously shown. He finds his career motive in mathematics: "I want to do whatever has the most mathematics in it, when I grow up."

A has always been healthy. He has never been subject to a chronic disorder. Adenoids and tonsils were removed at 6 years of age. When he was 3 years old, he was nearly run over by an automobile, but escaped with a twisted ankle. He is not nervous. Measurements of physique show him above average for his age in size. Measurements repeated annually show him about two inches taller, and about ten pounds heavier than unselected children of his age. For instance, when 8 years 6 months old, he was 50.3 inches tall, and weighed 66.5 pounds. Physical examination reveals no defects except myopia, on account of which he wears glasses.

In this case, also, as indeed in any of these cases, a large volume could be written to present in detail all of the constructive work and creative ideas. At the age of 3 to 6 years, A had an imaginary land, which he called "Center Land." It seems to have served chiefly the purposes of wish fulfillment. In this land children stayed up all night. They could play with fire whenever they wished. He lived there in a hundred-story house, with an elevator which he could run by himself. By the age of 6, this phantasy had nearly ceased to engage him and at 9 years he seemed to recall it but vaguely.

A has always attended private schools since arriving at school age. He has always been a problem to his teachers,

in respect to placement. Not interested in the work of school grades even two or three years beyond the norm for his age, too small to proceed beyond, and too small indeed to participate successfully in the social life of the children with whom he is graded, his school life has presented many puzzles both to him and to his teachers. He has not been allowed to advance in school at the rate allowed to Child E and Child D, but has, on the contrary, been advanced at a rate representing compromise between intellect and other aspects of developing personality. No doubt A, like E and D, could have been made ready to enter college at 12 years, had he been advanced in accordance with intellect alone.

Traits mentioned as faulty by teachers are "absent-mindedness," "lack of interest in group activities," "untidiness," and "slowness to take advice." Parents mention "slowness to take his own part in a fight." Traits mentioned as admirable are "kindliness," "precision in treating the data of thought," "good humor," "honesty," "emotional control," and "reticence."

Repeated tests of intelligence show that A has no tendency to become mediocre as maturity is approached. It has been stated that at the age of 6 years 6 months his IQ (Stanford-Binet) was found to be 187. A year later he rated exactly the same. At 8 years, he made 95 points on Army Alpha, and at 10 years his score was 166 points, which exceeds the median score of postgraduate students in American universities.

Figure 19 (page 111) shows how A could amuse himself at the age of 11 months, by feats of motor coördination. The usual complaints of "poor motor ability" have been made from time to time by his teachers, their judgment being based on the performance of children two to three years older than A, with whom he has been graded in school.

XII. CHILD B

Child B is a girl, born November 25, 1912. She was discovered in a private school, in the course of a systematic survey made by Malherbe. At the age of 8 years 3 months her IQ was 189; at 9 years 4 months, it was 188; at 12 years, her score on Army Alpha was 148 points.

B has attended private schools, her rate of progress being such that she reached senior high school at the age of 12 years. It is certain that B has never worked to the full extent of intellectual capacity in school.

This child began to walk at 15 months and to talk at 9 months of age. She cut her first tooth at 7 months. As soon as she was able to walk out with her nurse or mother, at about the age of 24 months, B began to notice the letters on billboards and to spell out the words. By the time she was in the third year of life, she could read fluently in simple books. At 5 years, she knitted on steel needles socks which were worn by her infant brother.

At the age of 9 years, B listed her favorite diversions thus: "All sorts of out-door games; then reading; then drawing; then playing with dolls, sometimes." She, too, had an imaginary country, which seems to have persisted till about the eighth year of age. This was "The Country of Grown-up-ness." Asked at about this age, "What will you be when you grow up?" she replied, "A doctor," and then added, "I will learn to sing too, and learn to combine several things." Asked the same question at the age of 12, she said, "I want to be an authoress, actress, artist, and musician."

B is the only one of the children here reported who has shown any success or interest in leading or organizing fellow children. She has organized clubs and games. One of her teachers says, "She was among the most popular children in the school."

The median IQ of children in the school then attended by B was about 125.

In this case the ancestors are to be traced chiefly to the peoples who settled the British Isles. B's first ancestors in America came to New England in colonial days. Her paternal grandfather was of English descent, and her paternal grandmother of Irish descent. Her maternal grandfather was of Irish-Spanish blood, and her maternal grandmother of Irish descent. B's father was born in Vermont. He is an officer of high rank in the United States Army. After being graduated from high school, he entered the United States Military Academy at West Point, passing the entrance examinations at 16 years. He was the youngest cadet ever admitted to the Academy up to that time. He has held posts of extraordinary trust in the pursuit of his profession. He was 42 years old when B was born.

B's mother is a graduate of high school and of college. Her career has been that of housewife and mother. Although the mother of seven children and mistress of a large household, she still found time to attend lectures, when the family was stationed near a university. She was 39 years old when B was born.

Two of B's six siblings have had intelligence tests. The brother who is two years older than she, yielded an IQ of 167 (Stanford-Binet) at the age of 11 years. The brother who is six years younger than B, yielded an IQ of 139 (Stanford-Binet) when he was 6 years old. B is the sixth born of the seven brothers and sisters.

B greatly surpasses the norms for age and sex in physical measurements. At the age of 9 years 4 months she was 56 inches tall, and weighed 106 pounds. At the age of 12 years, she was 61.6 inches tall, and weighed 123 pounds. Measurements of grip in the hand show her to be stronger than the average.

No faulty traits of character have been mentioned in this case, by parents or teachers. The traits most frequently mentioned and emphasized are modesty, reliability, self-direction, poise, good humor, and "being a good sport."

XIII. CHILD C

Child C is a boy, born June 15, 1913. He was brought to attention by the principal of the public school which he had attended. The principal wrote as follows: "I have in the 5B grade of this school a boy who seems to be somewhat of an infant prodigy. His verbal memory, especially, is phenomenal, but he is underdeveloped on the physical side, takes no interest in manual work, and does not like to play with other children." C was thus referred for mental examination when he was 9 years 3 months old. His mental age was found to be 17 years 7 months, yielding an IQ of 190 (Stanford-Binet). He was then in grade 5B, working with children of a median mental age of about 10 years.

C was recognized as "out of the ordinary" by his teachers, but they did not perceive clearly just how he deviates from the usual. Some thought him merely "queer" or "odd." In spite of perfect work, he had been advanced at only a little more than the usual rate. The principal of the school was especially concerned because he seemed completely out of social contact with other pupils. He never joined in their games, and they never seemed to notice him. He spent his spare time sitting at his desk and reading. C is the child already referred to in a previous chapter as having exercised no leadership whatever in the "regular" class.[1] When he was transferred to a special class for gifted children, where the median IQ was 164, he soon began to make social contacts with the pupils, and during the subsequent three years he was elected by them to many posts of trust and honor. "C

[1] The child called J in Chapter V.

knows everything," they said, and "C will make us behave."

At the age of 10 years, C was judged by teachers to be fully prepared in knowledge to enter senior high school, but he voluntarily remained to graduate with the other pupils of the special class. He therefore finished elementary school aged 12 years 0 month, being chosen valedictorian of his class. There is no doubt that he could have been made ready to enter college at this age, just as was done in the case of Children E and D.

C began to walk at the age of 1 year 3 months, and to talk in sentences at the age of 1 year 4 months. He cut his first tooth at 9 months. He learned to read and to talk almost simultaneously. At the age of 3 years he could read simple matter fluently. When he was 4 years old, he went one day into a store with his father, and while the latter was making a purchase the child took a book from a shelf and began to scan it. The shopkeeper noticed the child looking attentively at the book, and for a joke said, "Boy, if you will read me that book, I'll give it to you." Instantly C began to read fluently and carried the book away from the astounded merchant. On another occasion, when he was about five years old, a woman noticed him searching about the house and said to him, "Are you hungry?" His reply was, "Yes. I'm hungry for a book." Apparently C has never had an imaginary land. He can recall no such experience, and his parents know nothing of it. His favorite recreation has always been reading.

C is descended in both lines from German Jews, who have been in the United States for several generations. The father is an accountant. He did not graduate from elementary school, having to go to work at an early age. He was 40 years old when C was born. The paternal grandfather was a successful business man; the paternal grandmother, a com-

petent housewife. One paternal uncle is a judge in New York City.

The mother of C is a high school graduate. One of her brothers was a physician who occupied an administrative position of great responsibility as superintendent of a hospital for the insane. His ability is illustrated in the following incident. When a room full of insane patients sat viewing a moving picture, a fire broke out, smoke from which could be seen by all present. The superintendent rose and spoke to the inmates in such a way that all went out in an orderly manner and were saved, though the fire proved very destructive. A cousin of the mother is a writer, and another cousin is a judge. The mother has never followed any occupation other than that of housewife. She was 33 years old when C was born. C is an only child.

The traits of character most frequently ascribed to C by those who know him well are honesty, reliability, bravery, loyalty, and precision. He is a stickler for the exact. No statement is right unless it is exactly right. It is easy to see how this trait might antagonize other pupils and even teachers, and others in authority. He does not hesitate to rectify imperfections in erroneous statements.

When asked at the age of 9 years what he would be when grown, the following conversation took place:

Q. What do you think is the most interesting vocation? What would you like to be when you grow up?

A. Well, the answer to those two questions is not the same one.

Q. Then tell us first what you think is the most interesting vocation.

A. Science, especially astronomy.

Q. And what vocation would you like to follow when you grow up?

A. To be a medical doctor.

Q. But why not be what is most interesting?

A. Because a person cannot make much money being an astronomer. I never heard of anyone at the Lick Observatory earning fifty thousand dollars a year.

Q. But do medical doctors earn fifty thousand dollars a year?

A. It is possible for one to do it. Some of them do.

Q. Do you think being a medical doctor is the most lucrative occupation?

A. No. It would be more lucrative to get into Standard Oil.

Q. Then why not go into Standard Oil?

A. Because it isn't so interesting as being a medical doctor.

Q. Which is the more useful occupation — medical doctor or astronomer?

A. Medical doctor. Because a man does not care much for a blazing star a million miles away if his wife is sick. Anyone cares more for a *person* two feet away than for a *thing* a trillion miles away.

The ambition to become a doctor of medicine has persisted for three years and gives an impression of permanency.

Scores of anecdotes could be cited to illustrate the interests and the fine intelligence of this boy. In walking through the halls of the College with him, on an occasion when he had come for a mental test, the present writer saw what seemed to be an exhibition of Chinese costumes in a glass case, and called C's attention to it, saying, "Look at this exhibition of Chinese work." C looked closely at the exhibit for several moments without comment, and then said, "Well, I believe it is Japanese work, isn't it?" He then proceeded to point out certain minute differences which are found between the work of Japanese and of Chinese and which were later verified by an authority on the subject. When he went with his class to visit a new high school building in the city, he was missed as the others began to move to another corridor and after search was discovered in the chemical laboratory copying in a notebook the names of all the chemicals in the bottles, as they appeared on the labels.

In physique Child C is of average height, and slightly below average weight. His principal in describing him spoke of him as "underdeveloped" physically. However, at the age of 11 years 7 months he was 57 inches tall, and weighed 69.9 pounds. His appetite for food has never been very satis-

factory, but in spite of this fact his general health has been good.

XIV. CHILD F

Child F is a boy, born November 14, 1914. He was discovered in the course of a school survey conducted by Dr. Margaret Potter of The Vocational Service for Juniors, in New York City. The score made on a group test by the child was so very high that it seemed impossible that one so young could have produced it without coaching. The child was summoned, and soon convinced the examiner by his performances on various mental tests that no coaching had been involved in his phenomenal score. He was then 9 years 4 months old and yielded an IQ of 188 (Stanford-Binet). He was in grade 6B, his mental age being 17 years 7 months. Being placed in a special class for gifted children after the test to which reference has been made, he completed the elementary school course in June, 1925, with honor, and entered senior high school two months before his eleventh birthday.

The parents of F kept no written record of infancy. From their retrospection they state that the child began to walk at 14 months, began to talk at about 24 months, and learned to read at between 4 and 5 years of age. His favorite amusements during childhood have been reading, baseball, basket ball, and running. His chosen playmates have usually been several years older than he. Interest in dictionaries and encyclopedias is very strong. On a certain occasion he won a prize at school, the prize being a book. Several books, of supposed interest to a boy, were offered to him from which to make a choice. The child looked them over and then asked that if it could be allowed he be given a dictionary instead. The teacher accordingly gave him a dictionary, of which he makes constant use. In reading he seldom passes a strange word without looking up the meaning and pronunciation. At

the age of 10 years, he looked forward to science as a vocation, — "Science, especially physics."

Child F is of Scotch-German descent. The father is a clerical worker. He is a graduate of grammar school, and attended high school for three years. His remote ancestors came from Scotland. No eminent persons are known among near relatives, but the family line has been traced directly to the family of Argyll in Scotland, whose history dates from 1651. The exact relationship is not stated. The Argylls have been prominent in the military, literary, and political life of Scotland and England. The average length of life in progenitors of the father has been above 70 years.

The mother's family is German-American. Little is known of the early history of this family. The parents of the maternal grandfather came to the United States from Germany. The progenitors of the maternal grandmother have been in this country for many generations. The mother attended high school for two years, and earned a teacher's certificate. She taught for two years in a rural school before her marriage. There have been no outstanding persons among near relatives. The occupational level has been that of the skilled trades. The life span of maternal progenitors averages above 70 years.

F is the first-born child of his parents. The father was 21 and the mother was 22 years old when he was born. He has one sibling, a brother five years younger, whose IQ was 147 (Stanford-Binet) when taken at the age of 4 years 1 month. Both of these children were born in a village in New York State.

The medical history in this case shows that F has had nearly all the common "children's diseases," — measles, whooping cough, chicken pox, scarlet fever. Tonsils and adenoids were removed at the age of 9 years. He is not at all nervous, sleeps soundly, and is stable in mood. Before being placed in the

special class, he had the difficulty usual to such children of finding suitable playmates. In the special class he proved to be a "good mixer," and readily made friends.

In physical size, F is not above average. At the age of 9 years 6 months he was 52.7 inches tall, and weighed 59.2 pounds.

XV. OTHER CASES

In addition to the children who have been described somewhat fully, there are a few others testing above 180 IQ, who have been mentioned briefly, or have appeared in tabulations, in the recent literature of child psychology. In 1923, Dvorak told of a boy of 183 IQ (Stanford-Binet), who was examined at the University of Minnesota. This boy was conspicuously maladjusted at school. He "hated school" and did poor work in the third grade. He was 8 years 7 months old at the time of examination and passed the tests at a mental level of 15 years 9 months. The authorities in the school were unsympathetic and resisted advice, but finally placed the child in the fifth grade, where both work and conduct improved greatly. This examiner also mentions a boy of 189 IQ, who was tested at the same university.

Burt in his account of mental tests in the schools of London, cites an English boy of IQ 190, but does not give a description of the case. The value of such reports consists largely in the detail in which they are given and in the care with which they are subsequently followed by further presentations of developmental data.

XVI. COMPARISON WITH YODER'S STUDY OF THE GREAT IN CHILDHOOD

Although the studies of young children who test above 180 IQ are fragmentary and unsystematic on the whole, nevertheless tentative generalizations are already possible, for compari-

son with what has been deduced from study of the great in childhood.

Yoder found that play interests were keen among those children who as adults became eminent, but that the play was often of a solitary or otherwise unusual kind. The same is true of young children who test above 180 IQ. The majority of the latter play little with other children, unless special conditions such as those found in a special class for the gifted are provided. They have great difficulty in finding playmates in the ordinary course of events, who are congenial both in size and in mental ability. Thus they are thrown back upon themselves and tend strongly to work out forms of solitary, intellectual play. Reading, calculation, designing, compiling statistics, constructing an imaginary land, stand out prominently among the recreational interests of such children. However, there is a decided interest in physical activity also in the majority of the children here described. They list swimming, running, baseball, basket ball, and "all sorts of out-door games," and they are reported to carry on these activities whenever favorable conditions can be provided. Yoder, too, found that many of those studied by him "enjoyed physical activity."

Yoder found no evidence that the great were weak or sickly in childhood, and he notes that unusual tallness was frequently mentioned. Similarly we find that children who test above 180 IQ greatly exceed the norms for height and weight, as a group, and that excellent health is characteristic of them. Of those here described, the majority are reported as in excellent health, a few are reported as but fairly healthy, while none is characterized as in poor health. They are not nervous, none being described as ill-balanced in emotional reactions.

Children testing above 180 IQ may be born at any time over a very wide range in the reproductive life of parents. Of those

here noted, the mothers ranged in age from 22 to 44 years, when the gifted child was born. The fathers ranged in age from 21 to 45 years. A similar range of age was found by Yoder among the parents of the great.

In the case of illustrious persons it was found that the great majority originated in families of superior social-economic status, and the same is true of children testing above 180 IQ. The occupations of the fathers in the cases cited here have been as follows: teacher, physician, railroad engineer, postal mail clerk, investment banker, expert in insurance, organization engineer, army officer, accountant, bookkeeper, and expert in advertising. None of them has a father who rates below Taussig's class two, occupationally.

In one respect there is marked difference between the findings of Yoder, and the findings with regard to the young children whom we have noted. Yoder's great persons averaged five siblings each. Children testing above 180 IQ, for whom data regarding siblings are given, average one and three-tenths each. Only one of them, Child B, has more than one living sibling. This contrast is in accordance with the decrease in size of family which has taken place during the past hundred years, especially as concerns educated parents. Counting Twins A and B as one case, we have data as to order of birth in twelve instances of children testing above 180 IQ. Of these, five were first born, including only children. Yoder found in families of more than one child a strong tendency for the great man to be in the elder half of the siblings.

In addition to this striking similarity in generalizations, many similarities of individual anecdote appear, between the data from biographies of the eminent and the case histories of children testing above 180 IQ. These cannot be brought out here in detail, but they will appear upon comparative reading to anyone who will study the subject.

XVII. ADDITIONAL GENERALIZATIONS

It is regrettable that written records of babyhood were not kept in all cases, and that we have to rely upon the memories of parents. So far as we can trust our data, there is a wide range in the age of walking and talking, and of appearance of the first tooth, among these very exceptional children. Age of walking varies from 7 months, in the case of Betty Ford, to 27 months, in the case of Child C. Age of talking varies from 9 months in the case of Child B, to 28 months, in the case of Child C. Age of cutting the first tooth varies from "before 5 months," in the case of Elizabeth, to 9 months in the case of others. The median in each respect, however, shows unusually early development for these infants as a group.

Much more nearly uniform in conspicuous earliness than walking, talking, or dentition is development of the ability to read. Nearly all of these children learned to read words during or before the third year of life. All of them, for whom data as to reading are given, could read when they were four years old. Moreover, in nearly all cases this ability developed without the aid of formal instruction. It is interesting to count the instances in which billboards are mentioned as a means of informal introduction to letters. Evidently to a mind ready for it, the modern environment of a town or city affords sufficient opportunity to learn how to read, without attending school. As to the uniformity with which early reading appears, it is probable that this is due largely to the ease with which "reading" can be detected unquestionably as such, in comparison with "walking" and "talking." If the meaning of the latter were as definite in the minds of parents as is the meaning of the former, perhaps there would be a greater tendency to uniformity in age of walking and talking as reported for the group.

It is noticeable that in sections of the country where private schools are well established, there is a tendency for these children to be found in such schools. Of the six children found in New York City, four were in private schools, though the proportion of the total number of school children being so educated is very small.

Another generalization that can be made about these children is that nearly all have been school problems. They do not fit into the routine of the school. In many cases neither they nor their teachers understand the reason for the misfit. Even such gross misinterpretations are possible as that the trouble is due to stupidity, willfulness, or nervousness on the part of the child. Adequate analysis of the situation is possible only by means of mental tests.

As children testing above 180 IQ are so extremely rare in the population, it can hardly be expected that schools will stand equipped to recognize and handle them in an ideal manner. Most schools never have occasion to deal with a child of such caliber, and yet one of them may appear at any time in any ordinary school. The nearest approach to provision for them would perhaps be to require some study of the subject by every certified teacher. In this way they would have a chance of being recognized wherever they happen to appear, and of having some intelligent adjustments made to suit their needs.

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CHAPTER X

Experimental Education of the Gifted

I. FAMOUS INSTANCES

Special education for gifted children has been carried on for a long time — possibly since the beginnings of formal instruction — but not until recently in an explicit and well-informed manner. Systematic and prolonged education began indeed among social groups of superior intelligence, and for a long time was limited to them. We do not, however, suppose that all children in these groups reached that extreme degree of intellectual ability to which we here limit our concept of "the gifted."

The history of education gives us isolated instances where a child of extraordinary intellect has been privately educated, with remarkable results. The education of John Stuart Mill, of Thomas Macaulay, of Karl Witte, and of Christian Heineken may be considered to exemplify such instances, though it is not clear to what extent those involved realized all the aspects of the situation. Parents who achieve a remarkable result in the privately conducted education of a gifted child, often attribute the success to their special methods of teaching and affirm that any child would show an equal amenability to their instruction.

Mill was educated by his father in such a way that at the age of four years he could read not only English, but Greek. Between the ages of three and eight years, he read Herodotus, Lucian, and Plato in the original. Also he read in English

the works of Hume and Gibbon. Before he was twelve years old, he had studied geometry, algebra, and differential calculus. Before the age of twelve, also, he became greatly interested in science, reading Joyce's *Scientific Dialogues* with special pleasure. In his autobiography, Mill refers regretfully to the regimen of studies which consumed his childhood. The judgment of his maturity apparently was that he would have done better to have had a less studious infancy. His recorded attainments show, however, what can be achieved in the education of a very gifted child.

The history of Thomas Macaulay's education is similar to that in the case of Mill. At an age which we term "preschool," he too had mastered the ancient languages, and had other prodigious achievements of learning to his credit.

The father of Karl Witte has furnished a somewhat elaborate account, from which we find that the young Karl learned to read before his fourth birthday, and shortly afterward learned to write. At seven years and ten months of age, a public demonstration of his ability to read was given, covering Italian, French, Greek, and Latin. He passed tests of fitness to matriculate at the University of Leipsic, when he was nine years old. In the field of mathematics he pursued analytical geometry at eleven, and calculus at twelve. At fourteen he achieved the Ph.D. degree and was made a Doctor of Laws at sixteen. At twenty-three he became full professor of jurisprudence in the University of Breslau. Subsequently he was called to Halle, where he spent the remainder of his life, teaching and writing. He died, still engaged in mental work, at the age of eighty-three, having failed to fulfill the gloomy prophecies of early death, which had so often been urged upon the father who conducted his early education.

Like so many parents of the gifted, Pastor Witte did not realize that his son was of extraordinary intelligence. He

believed that "any man, normally well endowed, can become a great man, if he is properly educated." His special method of educating properly seems to have been merely to give his boy companionship. According to his account, the child was strong, healthy, and playful, and without vanity or conceit. From the total record, in the light of modern knowledge, we must conclude that Karl Witte's intelligence quotient was not less than 180. It is interesting to note how his history resembles the histories of children just described by us in Chapter IX.

The child, Christian Heineken, in contrast with Mill, Macaulay, and Witte, who lived to be old, died at the age of four years and four months. In this case it is the tutor who is historian, in a book comprehensively entitled *The Life, Deeds, Travels and Death of a Very Clever and Very Good Four-year-old Child, Christian Heinrich Heineken of Lübeck, Described by His Teacher, Christian von Schoeniech*, first published in Goettingen, in 1726.

> The little Heineken was a lovable child [according to this book. At ten months he had learned to name objects depicted on the walls of his nursery, and on a white stove that stood in it]. They told him the names of these figures, that one a cat, that a tower, a lamb, a mountain. The next day, December 4, they asked him where the cat, the mountain, the lamb were, and behold, the child pointed with his tiny finger, and showed every time the very picture, that had been named to him. Nay more, he now took pains to repeat the word that was said to him: to say cat, mountain, tower for himself: he watched with concentrated gaze the mouth of the one speaking, attended to the movement of lips and tongue, echoed the sound and repeated it, until finally he could articulate it.

So impressed were his elders, that they secured a teacher for the infant. Before he was a year old, he had memorized the best stories in the five books of Moses. At fourteen months he knew stories from the Old and New Testaments. At four years he could read but "he could not write; his little fingers were too weak for it." He could perform the four fundamental

operations in arithmetic. He could use French and had mastered fifteen hundred Latin quotations. He knew many geographical facts. "And now the fame of the wonder-child had spread through Europe, and a crowd of people came to see and to hear." Audience was given him by King Frederick IV, at which he displayed astonishing tact of speech and manner.

Various additional instances of similar order might be cited. It seems very probable that with special educational opportunity, any child testing above 180 IQ could do all that these prodigious children accomplished. This inference arises from the descriptions of children testing above 180 IQ, as they have been presented in Chapter IX.

II. GREAT MEN AND THE SCHOOL

Mill and Witte were educated at home in childhood, and it is surprising to what extent this has been typical of great men in the past. Of the fifty great persons studied by Yoder, many were tutored at home. We have, however, numerous accounts of the attendance at school of persons who have attained eminence. From these records we learn that such persons in childhood were by no means invariably well adjusted to the work of the schoolroom, nor were they always appreciated there. Positive dislike of school appears in some instances. Francis Galton wrote as follows, in 1836, at the age of 14 years, from the boarding school in which he had been placed.

> I do not like the Dr. taking our class at school, he expects the grammar said more perfectly than we can, and thrashes the lower part of the class for every mistake they make in construing; this morning he thrashed 11 fellows in 8 minutes!! So we have no peace at home through Earp, and no peace at school through the Dr. I wish papa had taken me away at the Holidays, but of course he won't; he has no reason that I know of except about changing schools, as forgetting that I am not getting on in the least and every day is a day wasted. . . . How much better it would be to remove me before it is too late.

A year later Galton wrote:

Also on thinking it over, it seems to me that 6 books of Euclid are very little for 2 years. Now there was one thing which I forgot to say about English reading, that my time of life is the one to make the most use of hereafter, and can any person get on anywhere without having read certainly a great deal of English? When I read now I am obliged to read under the table at meals, or pick up time as I can which amounts to very little in the end. As for my classics, I certainly am not getting on. . . . I am not going down in my class, but then my class is remaining where it is.

In his old age, Galton said of the first school to which he was sent at the age of eight and one-half years: "The school was hateful to me in many ways, and lovable in none, so I was heartily glad to be taken away from it in 1832." Again, of his school days he wrote, in 1908: " . . . the character of the education was altogether uncongenial to my temperament. I learnt nothing and chafed at my limitations. I had craved for what was denied, namely an abundance of good English reading, well taught mathematics, and solid science. Grammar and the dry rudiments of Latin and Greek were abhorrent to me, for there seemed so little sense in them."

Terman has calculated that the intelligence quotient of Francis Galton in childhood must have been approximately 200; so it is evident that the school was here dealing with an extremely gifted child. That this fact was but indifferently appreciated by his teachers appears in their reports, some of which have been printed in the biography of Galton. One of them wrote that the child "found it irksome to tie down his attention to the exactness and niceties which distinguish a good classical scholar."

It is generally the case that boys dislike most what is most needed for their peculiar turn of mind. He will, I think, do well, for though he does not entertain all the horror of false quantities or all the admiration of Greek accents which are felt by some of his fellows, he is docile and willing to submit to occasional defeat.

Meadowcroft, in his biography of Thomas Edison, relates that Edison, "on account of his supposed delicacy, was not allowed to go to school at as early an age as is usual. And when he did go, it was not for long. He was usually at the foot of the class, and the teacher had spoken of the boy to a school inspector as being 'addled.'" Hearing of this report, Edison's mother, who was an experienced teacher, removed him from school and instructed him at home. The biographer gives us these facts about Edison's early training:

> The quality of the education she gave him may be judged from the fact that before he was twelve years old he had studied the usual rudiments and had read, with his mother's help, Gibbon's *Decline and Fall of the Roman Empire*, Hume's *History of England*, Sear's *History of the World*, Burton's *Anatomy of Melancholy*, and the *Dictionary of Sciences*.

Similarly, Cardinal Wiseman as a boy was thought "dull and stupid, always thinking and reading." Hume seemed to those around him simple-minded. Probably these gross misinterpretations of conduct in childhood were due to the fact that these children displayed interests widely divergent from those thought proper to persons of their age. This divergence was variously considered to be eccentricity or stupidity. A boy who prefers to catch and examine insects, instead of playing baseball or dare-base, may easily be mistaken for "lacking" by an undiscerning observer.

No doubt many of those who have achieved eminence in adulthood were happy as children in school. For instance, S. S. McClure, who has exerted the influence of a great editor on his generation, writes as follows in his *Autobiography*, of his pleasure in attending school:

> One November day, when I was nearly eight years old, I was going home from school in very high spirits. I had then been at the head of my class in every subject for seven weeks, and I was feeling that my father would be very proud to hear this. My class, moreover, was the highest in the school, and my classmates were big boys, fourteen and fifteen years of age. It usually took a boy more than a year to get through

a form; but I had started to school when I was four years old, and in three years I had got into the sixth form, doing two forms a year. I found it exciting to stand at the head of a class of boys nearly twice my age, and I tried hard to keep my place at the head.

It is interesting that the adult attributes his scholastic progress to unusually early entrance into school. The school in this instance was a small country school, operated, as is usual in such places, on the plan of individual progress, without much account of the conventionalities of grade progress. A pupil could enter young, if he could do the work required. In schools where the age of entrance is not legally restricted, young children of very superior intelligence may enter much "under-age," and their school progress is thereafter mistakenly ascribed to the mere fact of having entered unusually early, instead of to the intelligence which rendered that early entrance possible.

Biographers of the eminent do not as a rule give very satisfactory school histories. There are, nevertheless, a sufficient number who were ill-adapted to the routine of school to have given rise to the legend that many great men were dull as children, and "could not learn at school." These stories remind us of current instances in which very highly gifted children are not well adjusted in the schools of our own day. A child of IQ above 180 is indeed very likely to constitute a "school problem" in contemporary classrooms, as is very apparent from the case histories of children here presented in Chapter IX.

One more phase of the school life of eminent men should be noticed here, because it throws some light upon the question of very early entrance into college. Children testing above 160 IQ will enter college under sixteen years of age, if permitted to traverse the established curriculum at a pace that will keep them occupied. The question is often asked as to what may

be the effect upon health and longevity of such early entrance into college. The history of great men allows us to obtain some insight into this matter.

The following great and long-lived men, as examples representing many others, entered the university as regular students before they were fourteen years old. James Thomson entered at twelve years of age, became a great engineer, and died aged seventy. William Thomson, his brother, who later was made Lord Kelvin, entered at the age of ten years, won fame in the field of physics, and died at eighty-three. The mathematician Gauss went to the university at eleven, won fame in his studies, and lived a long life of intellectual accomplishment. Hugo de Groot, or "Grotius" as he Latinized his name, entered the University of Leyden, aged eleven years, and was graduated three years later. He became a great pioneer in the founding of international law and died aged sixty-two years. Justice Bennett Van Syckel entered Princeton at thirteen, was graduated at sixteen, and died at ninety-one after a distinguished career, including thirty-five years of service on the bench of the supreme court. Judge Lacomb, recently deceased, federal jurist in the United States for twenty-nine years, was graduated from Columbia College with honors at the age of seventeen. He was so young when he received his degree in law from the same university, that he had to wait two years before he could be admitted to practice. He died, aged seventy-nine. Elihu Root was graduated at nineteen from Hamilton College, as valedictorian of his class, and at the age of eighty is actively engaged in such a way as to be called "counsel to the world."

In a recent study of the age at graduation from college in the case of persons mentioned in the 1925 edition of *Who's Who in America*, Cleland found that those who achieve this degree of eminence are apt to complete the college course earlier than the

average age of graduation from college. This almost certainly means that such individuals tend to enter college when they are younger than the average freshman.

III. UNINTENTIONAL EXPERIMENTATION

The instances just cited were experiments in the education of gifted persons, performed without explicit intention to experiment. They yield us, nevertheless, certain data of value. They show that the school as conventionally established, is not always congenial to or appreciative of extremely gifted children. Also, they demonstrate that very early entrance into college may be followed by a career of great distinction, and by very long life. They strongly suggest that individuals of the intellectual acumen which will later cause them to be included in biographical dictionaries, usually do, in fact, win their way into college at an early age, under ordinary conditions.

That unintentional segregations of superior children in schools located in restricted residential sections and in private schools have been revealed in recent years, by the use of mental tests, has already been pointed out here. Many of the private "modern" or "experimental" schools of the present day are virtually schools for superior children, their pupils all rating in the upper half of the distribution of general intelligence. Those in charge of them have been much surprised at the results of mental surveys, having supposed that their pupils were "good, average children." The superior intelligence of the pupils in many of the experimental schools may, perhaps, explain why the work of the latter does not more readily affect general educational practices.

Also, we know now that secondary education in the United States, where it is provided at public expense, is quite markedly selective. The college preparatory high school presents

difficulties which are surmounted with great effort, if at all, by adolescents of average intelligence. These facts are by no means widely familiar. It has been assumed in the past that the failure of the majority of pupils to reach high school was due to causes irrelevant to the quality of intellect. We are just beginning to understand the part played by native endowment in the selective process.

IV. RAPID ADVANCEMENT CLASSES

Commencing in the latter half of the nineteenth century, the public schools of this country began to experiment with flexible schemes of promotion, with a view to permitting rapid advancement of the capable. In this movement, the St. Louis plan was a pioneer effort. This was evolved by Superintendent Harris, primarily as a way of recruiting the upper grades of the St. Louis schools, which were being constantly depleted by children leaving school. Promotions were made every ten weeks, the aim being to promote the few most able, rather than to "leave back" the least able.

Following this, in 1895, Superintendent Shearer, of Elizabeth, New Jersey, devised a plan whereby each of the eight grades in the elementary school was made into three or four sections, according to the abilities of the pupils. Each of these sections was allowed to traverse the curriculum at its own characteristic rate. As soon as a child demonstrated ability to join a higher section, he was advanced. Some similar plans are in use at present. The Santa Barbara Concentric Plan divides the children in each grade into three groups. All groups must perform certain minimal essentials, but the B pupils do more work than the C pupils, and the A pupils more than the B pupils. The Cambridge Double Track Plan, now somewhat modified from its original, is applied to the last six years of a nine-year course of study. During these six

years, an able pupil may save two years. In the Portland, Oregon, Plan the course of study is divided into fifty-four parts, covering eighteen terms, of five months each. In this series of promotions, the bright may advance at a rate more rapid than the average.

According to the North Denver Plan, all pupils are held to a certain minimum requirement, but the more capable may detach themselves temporarily from a class, to give time to some extensive reference work, or to some special topic. Pupils thus may not gain time, but they learn more while going at the usual rate of promotion. Some pupils do, however, gain time also. The Group System in New York City aims to advance the bright child, and to secure at the same time thoroughness in work. Two group plans are recognized, the Constant Group and the Shifting Group. In the former plan, pupils are classified according to ability to advance, in three great sections, which remain constant, while in the latter, the membership of sections is not necessarily constant, as promotion may be made at any time. Both plans have as one of their aims the advancement of the bright child.

Still other flexible schemes of advancement represent some features of a return to methods of individual instruction, which prevailed before the economy of class instruction was discovered in the seventeenth century. Thus in Pueblo, Colorado; in Batavia, New York; in Newton, Massachusetts; in Winnetka, Illinois; in The Children's University School, in New York City; in the Decroly Classes in Brussels, and in other places, we see the gifted being cared for by plans of individualized instruction.

Children for rapid advancement sections or classes, established previous to 1916, were selected by teachers' judgments and by school marks. These classes, in consequence, contained children of various degrees of intellectual ability, from

very dull to very gifted (the majority, however, being of better than average intelligence). Children dull, but old, are found in these classes, selected because they have been doing good work in a grade for which they were much over-age. Still others are recommended because they possess some special talent, which is misinterpreted as being intellectual in character. Rapid advancement classes of the old type are, therefore, not, strictly speaking, classes for gifted children. The subsequent failures of the dull or mediocre intellects who chance thus to be included, mistakenly selected as "bright," doubtless contribute to the popular fallacy that bright children often become dull "later on."

V. SPECIAL CLASSES BASED ON MENTAL TESTS

Among the first of the experimental classes explicitly for gifted children, selected as such by mental tests, was that reported by Race, in 1918. This class was selected from the pupils of Louisville, Kentucky, by means of Stanford-Binet tests. The range in IQ was from 120 to 168, with a median at 137. The children made very rapid progress as a group. They covered the prescribed curriculum of the elementary school at about twice the ordinary rate, without more than ordinary effort. Race found them to be stable, healthy, and capable of work much beyond average.

Since 1918, there have been many reports of classes similarly selected. Gillingham has presented a study of the school progress of twenty-five children testing above 120 IQ (Stanford-Binet), who were pupils in a highly selected private school. The conclusion was reached that they did not do superior work at school, that their traits of character were undesirable, that they were inferior in muscular control, and that rapid advancement should not be recommended for bright children, "for, like throbbing engines, their minds beat

on far into the night, and unless helped to slow down they will beat themselves out long before maturity." This is the only investigation of bright children in relation to the school that has led to such conclusions. It is possible that the judgments made were subject to some peculiar criterion, or that the group studied was subject to some selective factor, which would cause it to differ from all other groups which have been reported. As a matter of fact, the data offered in regard to school work of this group fairly admit of the interpretation that it was of superior quality.

In 1919, Specht reported experimental classes for the gifted, which had then been in operation for about three years, in Public School 64, Manhattan. Children testing above 120 IQ (Stanford-Binet) were segregated into Terman Classes, and were allowed to learn as rapidly as they would. Under these conditions the children were graduated from the elementary school at the age of about twelve years. Efforts were also made to present subject matter not included in the prescribed curriculum. These children, clustering about a central tendency of 135 IQ, made progress at the rate of two and two-thirds terms per term, without extra effort or inducement.

Also in 1919, Whipple published an account of a classroom experiment, conducted in Urbana, Illinois, under a grant from The General Education Board. Very probably Urbana is not sufficiently populous to yield enough highly gifted for a special class of restricted age range. In any case, the experiment was unfortunately complicated by the fact that choice was made in the first instance by means of teachers' judgments. The result of all these adverse conditions was that the children studied were not really gifted as a group, the mean IQ (Stanford-Binet) being only about 117. However, the best quarter of the class were sufficiently superior to rate as intellectually gifted, and from the progress of these, Whipple concluded that children

are capable of school work in accordance with their intelligence as determined by mental tests, the very superior advancing much more rapidly than is usually allowed.

In 1923, Coy published her work, done with a class for children clustering about a median of near 135 IQ (Stanford-Binet), which was conducted experimentally for two years in Columbus, Ohio. Coy found these children able to progress comfortably at a rapid rate. Figure 33, reproduced from this experiment, shows the comparative grade achievement in educational tests of the gifted children, and of a group of unselected children of the same age, after a year and a semester of instruction. The gifted group excels markedly in every achievement measured.

The American studies of the past ten years have clearly shown that children identified by mental tests as of superior intelligence, can learn very much more rapidly, and can grasp much more complex ideas, than average children can. The proof of this has affected educational administration in various cities. At the Conference on Educational Research and Guidance, held at San Jose, California, in 1922, Dickson stated that during the preceding year about eleven per cent of pupils in the elementary schools of Oakland and Berkeley had been given special opportunity on the basis of superior endowment. De Voss reported that thirty-five children testing at or above 140 IQ, located in Kansas schools, were all doing superior school work, and showed an average acceleration of about one and one-half school years. These instances exemplify the findings of many investigators in the United States.

By 1923, or earlier, the emphasis in experimentation had shifted from the question of selecting pupils, to questions of curriculum, organization of classes, qualifications of teachers, and the like.

FIG. 33. — Graphs showing comparative achievement of gifted children, and of ungifted controls, in scholastic tests. (Reproduced by courtesy of Dr. Genevieve Coy, from her *Interests, Abilities, and Achievements of a Class of Gifted Children.*)

VI. CLASSROOM EXPERIMENTATION ABROAD

Previous to 1918, in Germany, France, and England, where experiments in education are to be expected, there seem to have been few attempts to provide the possibility of rapid advancement for the bright, in public elementary schools. A report from Charlottenburg, however, shows that a section for bright children had been established in the schools there even before the war. In the European countries, the children of the well-to-do attended and attend private schools, where tuition must be paid, and where instruction may be suited to their gifts. Nevertheless, according to what is known of variation from parental norms, and of the overlapping between offspring of parents in different economic levels, it is certain that there must be at any time gifted minds among the children being educated at public expense in these countries.

Educational experimentation with highly endowed pupils has been reported recently from Germany. It is only from cities that this work has been described, since where population is scattered, there are so few gifted within a school unit. Berlin, Hamburg, Breslau, Mannheim, Leipsic, Frankfurt, Charlottenburg, and Göttingen particularly have reported experiments since 1918.

The desirability of paying attention to the gifted who dwell in rural districts has been discussed with urgency in Germany, but no solution of this administrative problem has been announced. After the war, republican Germany abandoned the policy of educating children according to the occupational status of their parents. It was seen to be a primary condition of national rehabilitation to seek and to educate the gifted, wherever they might be found. As educational psychology is well developed in Germany, the selection of the *Hofnungskinder* — children of promise — has gone on rapidly and

systematically. So far as may be inferred from literature, Germany to-day gives more official recognition to special education on the basis of mental endowment as determined by objective test than any other nation. In Germany there is no embarrassment in acting openly upon the facts of biological nature, since the people have never been indoctrinated with the theory that all are born equal.

The methods of selection, and the organization of instruction, differ somewhat from city to city, as different persons have performed the work. In 1917, the *Begabtenschulen* were established in Berlin. Two psychologists, Moede and Piorkowski, directed the selection of the children, which was based on mental tests. Subsequently, teachers' judgments were also utilized in making the selection. Children placed in the *Begabtenschulen* complete the preparation for higher schools in three years less than the time ordinarily required. They articulate then with the *Gymnasium*, the *Oberrealschule*, and the *Realgymnasium*. In Berlin, the differentiated curriculum is stressed in the case of boys, but girls are not necessarily excluded from its provisions.

In the eight years which have elapsed since the *Berliner Begabtenschulen* were established, several reports have been rendered, as to their success. The children selected by the method of mental tests are said to be very ambitious, and the great majority easily go forward at the pace set. Some classes have also been formed in Berlin from time to time by means of teachers' marks alone. These have proved relatively unsatisfactory, "For, in fact, the best pupils appear in those classes where the choice has been made chiefly from tested children, while the classes not selected by tests yield in part pupils who are but of average ability, and must put forth overwhelming effort to meet the requirement."

In 1918, Breslau organized two *Sonderklassen* for the very

gifted, one for girls and one for boys. Children about twelve years old were chosen, the selection being made primarily by mental tests, supplemented by a questionnaire to teachers.

In these German experiments, national rehabilitation is explicitly intended, and the search is for the talent that can recreate industry. Thus we find the effort being made to devise and use tests of *technisches Verständnis*, of capacity to learn skill in handling objects and materials.

Countries other than Germany and the United States are doing little to promote classroom experimentation with gifted pupils. At least, such work is not reported in the literature emanating from other countries. In England, some work has been undertaken in the identification of the gifted, for scholarships, by means of mental tests. Burt, in London, and Thomson, in Northumberland, have accomplished interesting surveys. They have not, however, reported experiments in education.

VII. ADAPTATIONS FOR SMALL COMMUNITIES

The question arises as to what may be done in small communities, where there is not a sufficient number of gifted children, within a reasonable age range, to form a special class. A few educational administrators have worked experimentally upon this problem. One of the most interesting and suggestive of these experiments is that initiated by Superintendent W. C. French, of Drumright, Oklahoma. In this case the brighter pupils, as identified by mental tests and subsidiary evidence, are dismissed from regular classes two days each week. On these two days instruction is given, which the others do not have. This enrichment of school work is organized in unit courses of six weeks each. The subject matter selected for the purpose is extremely suggestive for further experimentation, and will be discussed later in detail.

Individual education for every pupil, as already described in Winnetka, and according to the Dalton Plan, also provides for the special education of the gifted in small communities.

VIII. EXPERIMENTATION IN THE HIGH SCHOOL

By far the greatest amount of explicit interest in education for the gifted has been expressed in connection with the elementary school. Experimentation in high school and in college has, however, been discussed, and possibly has been actually instituted in various places, from which there will be reports within the coming decade.

For instance, Almack and Almack studied superior pupils in the high schools of Eugene, Oregon. They found very few of these pupils working up to capacity, on a "mental age" basis. Teachers rated most of them as "very superior" or "superior," and final class grades for the year showed the median standing to be A (an equivalent of 90–94 per cent, with no grade below 85 per cent). Mathematics was the study placed first, according to preference, by these able pupils, with English second. The boys had in general chosen vocational careers that entail college training of a professional or technical character. The authors urge experimentation with the gifted in high school, for "The mere appearance of obstacles is no argument against introducing changes into school practice."

Other studies of the most intelligent pupils in high schools have shown that they are much below the median age for high school; that they are not, however, handicapped in achievement or in social relations, on this account; and that they are capable of more work than is expected of them. These conclusions generally relate to groups testing above 120 IQ. Hence many of those included do not fall, strictly speaking, into our category of the gifted, but they approach it.

IX. EXPERIMENTATION IN COLLEGES

In 1918, intelligence tests were introduced into a few American colleges, and since then the use of such tests has greatly increased. The statistics thus derived have led to conferences on the subject of the gifted student in college. This is somewhat anomalous, as all college students were at one time supposed to be gifted. The college was a place of "higher learning."

There is very good ground for believing that the intellectual caliber of students in colleges and universities has declined markedly in the United States during the past twenty to thirty years. Statistics of failure and of low standing indicate that the great influx into the colleges, which has characterized the decade past, has brought in with it a large proportion of intellects that cannot entertain the ideas presented in the course of a college education. A still larger proportion can entertain such ideas with barely passable success. From reflection upon these facts about the intellectual equipment of the student body has emerged the question of how to engage and how to reward the gifted intellect, in college.

At Stanford University, a special committee of the faculty has rendered a report on this matter, calling attention to the presence in college of persons lacking adequate intellectual qualifications and stressing the need of providing for the identification and fostering of the exceptionally able.

In 1921, The National Research Council instituted a round-table discussion of the gifted student in college. Special honors courses were advocated in which gifted students might be permitted to think and learn in accordance with interests and capacities, finally passing examinations for honors. Such suggestions are modeled on the British plan, of "reading for honors."

X. LEARNING UNDER LABORATORY CONDITIONS

Knowledge of the educability of children of high intelligence quotient does not rest exclusively upon their advancement under ordinary conditions of instruction in the classroom.

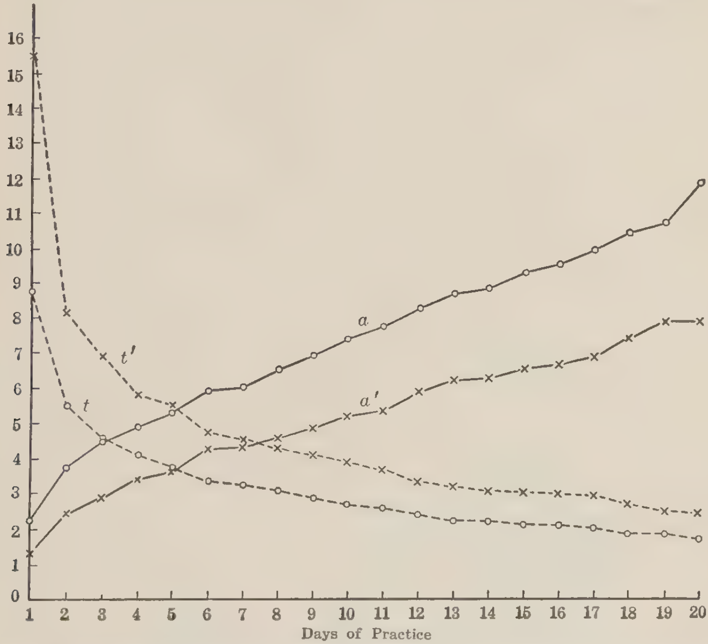
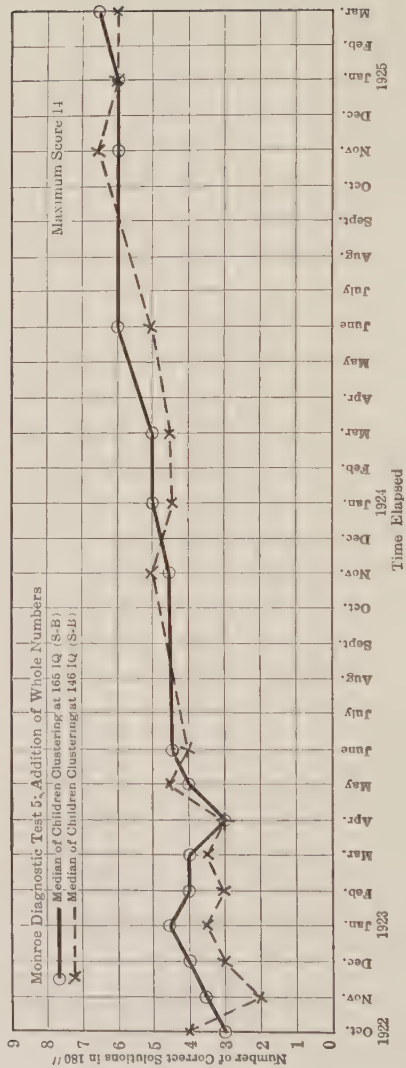


FIG. 34.—*a* and *a'* show improvement in learning of the 30 subjects who had scored above the group average in intelligence tests and of the 30 who had scored below average, respectively. Units give the average number of words per day's practice of 10 minutes, in terms of hundreds. Curves *t* and *t'* show for these groups in the same order the time required to read 1000 words, units being in 5-minute periods. (Reproduced from "Johnson's Measurement of Rate of Improvement under Practice" in the *Journal of Educational Psychology,* by courtesy of the author, Joseph Peterson.)

It rests also upon exact quantitative measurement of learning, under conditions controlled in such a way that results may be presented in the form of comparative graphs. It will be worth while to note some of these more precise studies here.


Monroe Diagnostic Test 5: Addition of Whole Numbers
Median of Children Clustering at 165 IQ (S-B)
Median of Children Clustering at 146 IQ (S-B)
Maximum Score 14
Number of Correct Solutions in 180″
0
1
2
3
4
5
6
7
8
9
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
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Jan.
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Mar.
Apr.
May
June
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Sept.
Oct.
Nov.
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Jan.
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Mar.
1922
1923
1924
1925
Time Elapsed

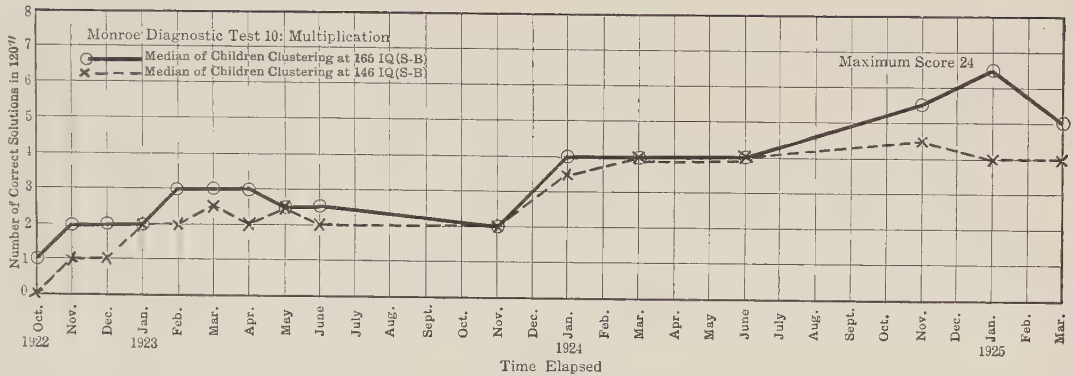
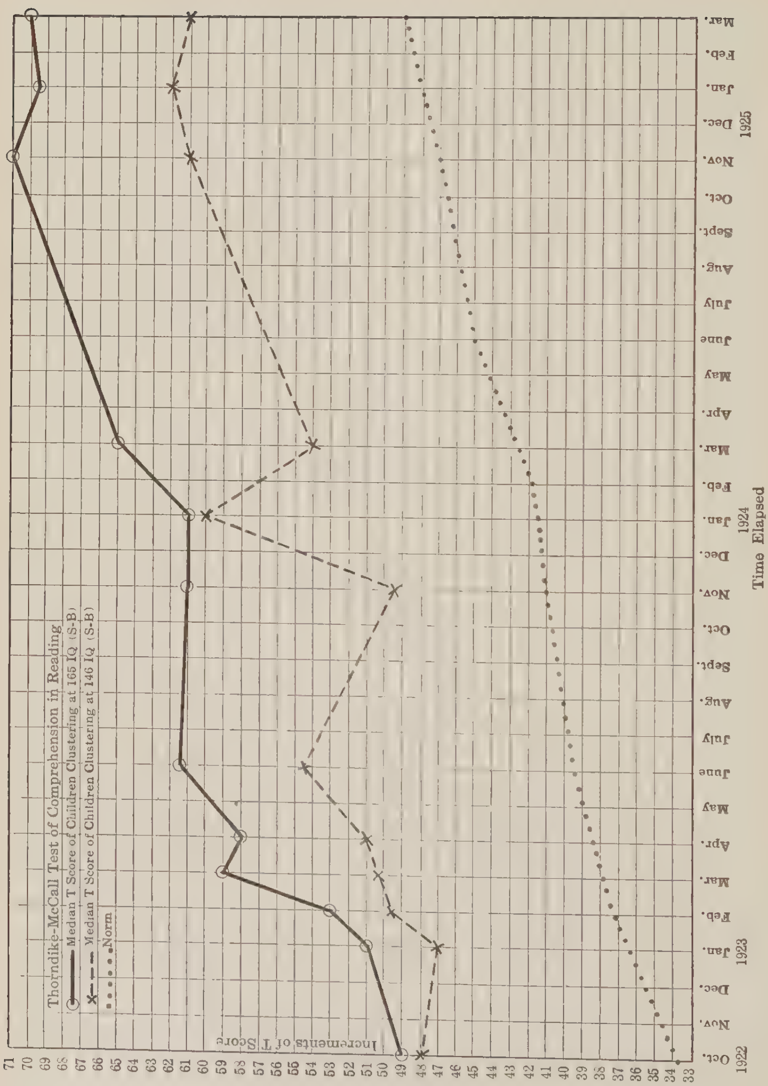


FIG. 35. — Showing, on this and preceding page, that between groups of "very high" and of "exceedingly high" intelligence respectively, educability in simpler processes is the same or nearly the same; showing also that both of such groups greatly surpass the generality of children, in learning. (Reproduced from a study by Hollingworth and Cobb, in the *Twenty-Sixth Yearbook* by courtesy of The National Society for the Study of Education.)


Thorndike-McCall Test of Comprehension in Reading
Median T Score of Children Clustering at 165 IQ (S-B)
Median T Score of Children Clustering at 146 IQ (S-B)
Norm
Increments of T Score
71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33
Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.
1922 1923 1924 1925
Time Elapsed

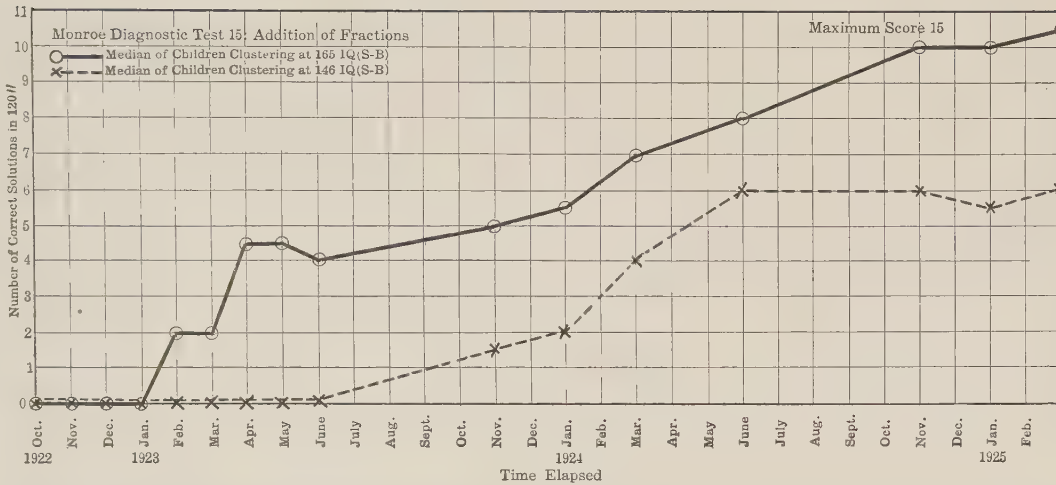


FIG. 36. — Showing, on this and preceding page, that between groups of "very high" and of "exceedingly high" intelligence respectively, educability in more complex processes is widely different; showing also that both of such groups greatly surpass the generality of children, in learning. (Reproduced from a study by Hollingworth and Cobb, in the *Twenty-Sixth Yearbook*, by courtesy of The National Society for the Study of Education.)

Johnson divided a number of college students into two comparative groups — a higher than average and a lower than average group, according to intelligence tests. He then submitted these two groups to a precise experiment in education, giving the two exactly equal opportunity to improve in respect to the average number of words read in a specified time. His results showed that the "higher" group were superior to the "lower" group in speed of reading at the outset, and that the former continued to exceed the latter, trial for trial, as both practiced. Later, Peterson presented Johnson's data treated in two ways, *i.e.*, by plotting the improvement in terms of the amount accomplished per unit of time, and in terms of the time required to read a thousand words. Whether or not the difference between the groups appears to increase with education, depends upon the terms used in comparing. But whichever terms are used, the groups remain distinctly separated throughout the whole period of training. From the mental tests, it would have been possible to predict accurately which group would exceed the other in ability, after equal opportunity to become educated. It must be borne in mind in scrutiny of these comparisons, presented here in Figure 34, that the two groups are not extremely different in mental capacity, as they are both drawn from the body *of college students* already rendered relatively homogeneous through selection by scholastic tests.

Hollingworth and Cobb have investigated differences in educability, when comparative groups both lie in the highest percentile of intellect. They had for experiment two groups of young children, alike in age, sex, race, home conditions, and educational opportunity, differing in that one group fell at a mean IQ of 165, while the other fell at a mean IQ of 146 (Stanford-Binet). These comparative groups were measured by standard tests of achievement, at stated intervals over a period of three school years.

Figure 35 shows that in such processes as simple addition of whole numbers, there is no measurable difference in educability between two groups both so highly selected for intellect. Figure 36 shows that as the processes to be mastered become more and more complex, containing more and more elements which must be related to each other spontaneously, the group testing at 165 IQ draws perceptibly away from that testing at 146 IQ, in educability. In such a complex process as reading for the comprehension of paragraphs, when both groups have unlimited opportunity to improve, children clustering about 146 IQ never overtake those clustering at 165 IQ.

Hollingworth and Cobb have presented altogether about thirty comparative curves of learning, of which those cited above are samples. These curves clearly demonstrate that when "high" intelligence is compared with intelligence "higher," by test, the latter is more educable whenever there is unlimited opportunity for all to improve. The difference between "high" and "higher" is revealed most clearly in the most complex tasks. The curves show incidentally that, under controlled conditions, children proved by test to be gifted greatly exceed the average for the country at large, in mastering the subject matter of the established curriculum.

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CHAPTER XI

Organization and Curriculum

I. PHILOSOPHY OF THE EDUCATION OF GIFTED CHILDREN

Because of the social attitudes induced by past utterances about democracy in this country, educators are hampered by a certain embarrassment in making frank provision for gifted children. It is felt that explicit recognition in educational policy of the facts about the gifted will give offense to a community grounded in the faith that all are equal.

A campaign of education in biology would be necessary in order to modify the current social philosophy, which has had for a result the policy of indiscriminate training for all alike. However, knowledge of the facts of human nature may increasingly dictate the action of educational administrators even without a complete revolution of public opinion, as is clear from the preceding survey of experimentation.

It has been urged that there need be no special provision for the able, as they can take care of themselves under any circumstances and may be trusted to find their own way through the world. We do not know the truth of this assumption and cannot know it until at least one generation of tested children has passed through adulthood. Doubtless the able do manage finally, by the method of trial and success, to win their way onward to an approximate realization of their powers. It has already been shown that they actually do

find their way forward in school, but not to a level commensurate with their capacity for functioning. In childhood, at any rate, if not in adulthood, rational adjustments of opportunity for the gifted yield measurable profit. Perhaps this could be shown to hold in terms of adult life, as well.

It would be generally conceded by those who know the history of civilization, that the most important fact about any population, as regards its potential wealth, industry, standard of living, and general culture, is the proportion of its members who grade above a certain high level of intelligence. Individuals of surpassing intelligence create national wealth, determine the state of industry, advance science, and make general culture possible. The one thinker who invented the steam engine, for example, did more to influence these affairs in his time than did all the manual laborers of his generation.

One who clearly comprehends that each advance in human usage comes through the mental work of some individual, and that only a small minority can originate, will feel that those few are worth conserving, if he believes that civilization is good. He will at least wish to be convinced by actual experimentation of the truth of the premise, that a gifted person will perform his work without special opportunity as well as with it.

The institution of education for gifted persons — those selected on the basis of innate endowment by objective test — is new in human annals. It therefore brings with it a large number of new problems which call for solution by experiment. Some of these problems have to do with the curriculum, others with administrative adjustment, others with the selection of teachers, the methods of teaching, and rates of progress. Although these problems are at present all in the initial stages of experiment, it is possible to discuss them somewhat clearly.

II. ADVANTAGES AND DISADVANTAGES OF RAPID PROGRESS

Should opportunity for the gifted child be provided by allowing him or her to progress through the ordinary school curriculum as fast as is possible with comfort? In this way nearly all children of IQ above 150 could enter high school at eleven years of age, and college at fifteen years or earlier. They could be graduated from college at an age not far from that at which adolescents ordinarily enter.

The objections to this procedure are based chiefly on the discrepancy between physical and emotional maturity on the one hand, and intellectual maturity on the other. Especially in the early years, this discrepancy is hard to reconcile. A child of eight years graded with twelve-year-olds, is out of his element socially and physically, though able to do intellectual work as well as they can. A child of 180 IQ, entering college at the age of twelve years, is perhaps deprived of personal contacts which would be of value for his psychological development, and which he could have had by entering college two or three years later.

Those who are capable of entering college at twelve or thirteen years of age are, however, children above 175 IQ, and of very rare occurrence. Children above 140 IQ can enter college by the time they are fifteen or sixteen. By that age they are not conspicuous among eighteen-year-olds, who constitute the mode for college freshmen. It is in the first years of the elementary school that the gifted seem so very much younger than their fellow pupils, if they are given double promotions commensurate with ability. A five-year-old among eight-year-olds is very conspicuous, but a fifteen-year-old among eighteen-year-olds is not. Three years of difference at an early period in development is much greater than three years of difference later. This is because of the shape of

the curves of growth, which are not uniform in rate of increment when measured against time. As age increases, the importance of a given discrepancy in time diminishes.

Thus rapid progress is an especially perplexing problem in the first years of the elementary school. Perhaps segregation, with rapid progress, during these years would constitute the best adjustment, with rapid progress through the regular grades after the age of twelve years. Such a combination of rapid progress and segregation would tend to meet some of the possibly valid arguments against segregation, which are to be considered later.

Difficulties of physical and social adjustment may, therefore, be cited as arguments against rapid progress through regular grades in the early school years. There are, nevertheless, weighty reasons why rapid progress through school, by some means, is very advantageous for psychological, physical, and economic adjustments in late adolescence. A very troublesome feature of modern civilization is the constant lengthening of the period of preparation for all learned professions. So out of proportion to the life span and to organic needs has the standard of professional life evolved, that it is now scarcely possible for young persons to become self-sustaining economically by means of a profession until nearly thirty years of age, if only the conventional rate of progress be maintained.

For the very gifted, who are those best fitted by nature for learned professions, it would be entirely feasible to bring the period of preparation within reasonable bounds by means of rapid progress in the elementary and secondary schools. A boy or girl of 150 IQ or better could arrive at self-sustenance in a profession by the age of twenty-three or twenty-four by entering college at fifteen and being graduated at eighteen, with the following four or five years in which to complete

professional training and apprenticeship. Unless there be some planned and conscious provision of the school for the rapid progress of these individuals, little or none of the time may be saved in preparation. Time-saving in the years preceding the professional school itself is suggested, because it would probably be much more difficult to arrange modifications of organization there than in non-professional schools; and also because a gifted mind will want to spend unlimited time in the mastery of the special branch of knowledge chosen as a life work.

III. ADVANTAGES AND DISADVANTAGES OF SEGREGATION

It has been suggested here that a combination of segregation with rapid progress through the conventional curriculum might be achieved, segregation being instituted in the elementary school only. Special opportunity classes for gifted children certainly offer many advantages. In the first place, they make it possible for such children to accomplish as much as they normally can, while in company with others of their own age. This desirable state of educational affairs cannot be achieved for a gifted child in any other way. The testimony of segregated children themselves shows that they greatly enjoy special classes. Children nine to eleven years old, who had spent two years in a special class and two to three years in regular grades, were asked to list the advantages and disadvantages of the special class from their point of view. Many more advantages than disadvantages were mentioned, and the advantages were listed much more often by these children. Disadvantages listed include "more work expected of the children," "children talk too much," "distance from school is greater," "several grades in one room are hard for the teacher," "other children in the school are jealous." As advantages were listed "our special library," "encyclopedias and dictiona-

ries for reference," "work given here in an interesting form," "new subjects," "extra subjects," "children of the same age in the class together," "freedom in the classroom," "children not cramped," "same class and teacher for several years," "children can advance more rapidly," "allowed to exhibit our collections," "can take trips."

From the viewpoint of interested adults, certain possible disadvantages have been urged. May not children who have been educated in segregation from the generality, derive a false idea of human nature, supposing all human beings to be competent and strong like themselves and their classmates? May they not become conceited, through being chosen for special classes? Will not the pupils of less intelligence lose a valuable stimulus to endeavor, by the removal of the gifted from their midst? Will there not be jealousy on the part of pupils not chosen which may react unfavorably upon all concerned? Will class-conscious groups be formed, in violation of democratic ideals?

The possible danger that gifted children may derive false norms of human competence by being segregated in school work from those less able, could probably be obviated by a combination of segregation in the elementary school, with work in regular grades later in high school. According to such a plan, the young child would be educated for several years under both conditions, and would have a corrective applied to possible mistaken impressions.

The objection that special opportunity classes for the able will tend to make the members conceited is probably groundless. It seems far more likely that work with competitors of one's own caliber tends to starve conceit, rather than to feed it. Observers have recorded that a pupil coming into special classes often meets a successful rival for the first time. If conceited from experience of intellectual dominance in the

regular grades, such a child may go through a visible emotional struggle to relinquish his concept of himself as unrivaled. If he remains in the special class, he is likely to leave it far less conceited than when he entered it. Occasionally self-feeling is so shocked by contact with successful rivals that a child is withdrawn, by the request of parents, from the segregated group and restored to the regular class, where conceit can flourish. From this point of view, therefore, segregation is probably very wholesome. A child may and doubtless will realize that he has been chosen for a class because he is unusually able; but he will be compelled to realize at the same time that there are many others who are "just as good" as he is, a fact not likely to be brought forcibly to his attention in the regular grades. If inclined to conceit, he will not derive from his school career the erroneous impression that he is, or nearly is, unrivaled.

The conceit of the gifted need in any case give little concern, apparently. According to the repeated testimony of teachers, they are rated much above average children in modesty, whatever the circumstances under which they have been schooled. There appears to be a decided tendency among the very intelligent to compare themselves with those above them, instead of with those below them, in any category of relative standing. One very gifted boy of ten years, asked to rate himself for achievement, wrote as follows: "I have not done much, when you think of Darwin and Newton and all the things they did."

There remain to be considered the possible effects of segregation of the gifted upon those from whom they are thus separated. Will the less intelligent lose anything by the absence of the most able pupils? The question cannot be answered, as we lack evidence. It is, of course, possible that the greater homogeneity achieved in the regular classroom

by the removal of the gifted child may be positively beneficial to the pupils of the class. A very able child frequently does much more than an average share of the talking in such a class, according to general observation. Statistics from stenographic reports would doubtless support this impression. The class forms a habit of passing "hard questions" on to him. In his absence, talking might be more generally distributed through the group and a greater expectation might be generated of searching out difficult matters for themselves. Thus the possibility must be considered that actually the class might be stimulated to greater activity by the removal of the classmate who can think for them.

Those who have in mind, in arguing against segregation, that the superior pupil will exert some mystical, contagious influence over classmates, of a nature to improve their innate capacity for understanding their work, speak from a false assumption. The intellects of classmates cannot be successfully stimulated in this sense. The stimulated ambition of a less able pupil, in situations where emulation is attempted, is no doubt far more likely to result in discouragement for the latter than to have any beneficent effect whatever.

In listing "disadvantages" of the special class, one member of such a class mentioned "jealousy on the part of other pupils in the school." Very probably there is a likelihood of jealous and envious attitudes on the part of pupils not chosen and on the part of their parents, if the fact be publicly stressed that a special class for superior children has been formed in a school system. For this reason an unusual degree of administrative tact and courage stands behind such classes at present existing. If the courage be mingled very fully with tact, which is simply effective knowledge of the stimuli which will arouse angry and jealous behavior, not so much of the former virtue will be required. In relatively large city systems,

special classes can be formed without becoming unpleasantly conspicuous in the procedure. In systems where various kinds of special groupings are being made as a matter of routine, an additional grouping of this kind need arouse no particular comment.

In this connection the designation of the special class is important. To label it "Special Opportunity Class for Superior Children" would be a good way to arouse hatred and envy among those not included (even though it ought rationally to arouse only admiration and hearty approval from all interested in the common welfare). Various practices have been evolved. In some instances, noncommittal designations have been chosen, as the name "Terman Classes" at Public School 64, Manhattan. Elsewhere the ordinary grade designation, with a noncommittal number attached, has been employed, as $5B_2$ or $6A_5$. Also, the term "Opportunity Class" has been used, as at Public School 165, Manhattan, and elsewhere. The latter name has been saved from untactfulness by the fact that "Opportunity Classes" have long been organized for the dull in these schools; so that "Opportunity" has an inoffensive connotation, applying primarily to provision for the unsuccessful! All things considered, the simplest solution may well be the adoption of some noncommittal designation, which still has an appropriate significance as in the case of "Terman Classes."

Expression of the fear that segregation of the able in school will produce class consciousness subversive of the ideals of democracy, seems to imply that at present in adult society men are mingling equally and freely with persons of all degrees of intelligence, in work, neighborhood, conversation, and recreation. No such condition exists, or ever has existed, in adult society. As life goes on, like-minded men are winnowed into social groups, partly by the outcomes of economic

competition, partly by preference for the same kinds of shelter and recreation, and partly by ability to perform the same acts of thought. Residential neighborhoods, circles of friends, business and professional associations, and clubs are all highly selected on the basis of like-mindedness. Such selective grouping involves mingling with unlike minds not freely or equally, but in ways restricted by mutual failure of enjoyment, and by the parts which mastery and submission necessarily play in maintaining coöperative existence. Social grouping on the basis of similarity in intelligence is inevitable. Any attempt to collect persons absolutely at random and form of them a social group that will find enjoyment in the resulting companionship and cohere, is bound to fail, as anyone who tries it may find out for himself. In adulthood, people live and learn in selected groups.

Why, then, should there be a determination to conduct the schools in a manner contrary to the provisions of biological nature? Such an attempt is sure to fail ultimately, even in form. If any tests whatever are to be applied, and tests in the way of "examinations" have always been given in the schools, the result is that the pupils are educated in selected groups. Pupils are now being educated, therefore, on a basis of selection, for the school curriculum acts simply as a prolonged mental test. Special classes for the gifted, for which the pupils are chosen by mental tests, merely bring about a more restricted, a more explicit, and an earlier selection.

Those who find themselves convinced that special classes for the gifted should be formed, or who wish to form such a class experimentally in order to gain first-hand knowledge, will be confronted immediately with the question, When should segregation take place? Should the special class be organized when the six-year-olds enter school? Or should it be instituted in the third, fourth, or fifth grade, for example?

Experimental practice has been various on this point. It has been stated that the gifted are segregated in Hamburg in the fourth school year, when the pupils are about ten years old. This gives teachers a chance to formulate judgments of physical stamina and of temperament, which are utilized as subsidiary criteria of selection. Very few of the reported experimental classes, selected by mental tests, have been segregated previous to the third or fourth year of school. "Sectioning" of six-year-old beginning pupils under three major classifications has, however, been reported from several cities. Available tests of intelligence will classify six-year-olds with a very fair degree of reliability, so that the sectioning at that age is reported to be satisfactory. There is, nevertheless, a practical reason why it would probably be impossible to form a special class for six-year-olds above 140 IQ, even in a large city. The infrequency of occurrence of such children necessitates drawing upon a large area to fill a class register. Six-year-olds cannot travel by themselves, and they probably should not travel far on daily trips, in any case, because of fatigue, unless very special arrangement can be made. Thus it would no doubt prove impossible to conduct a class for very gifted children under a minimum of eight years of age.

IV. QUALIFICATIONS OF TEACHERS

Teachers of gifted children should be selected with special reference to certain qualifications. One of the most important of these is a qualification of attitude. The teacher must be free from unconscious jealousy and from unconfessed bias against gifted children. At first thought this might seem an unnecessary stipulation, as it might appear absurd that an adult would be likely to entertain such an attitude toward a child. Nevertheless, emotional bias against the bright, identified as such by tests, does appear among teachers. Coy

found that the hostility of teachers in high school toward the children entering from the special class was sufficient to create problems of adjustment.

For instance, the mother of one child had visited a class in which the teacher had said to the children, "Especially bright, are you? *I* should say that you were especially stupid!" When the mother of No. 1 told him that he "must look interested" in Miss X's class, he replied, "Yes, I try to. But when we raise our hands, she says, 'Put your hands down. I'll call on you if I want you to talk.' But when we keep our hands down, she says, 'What, don't any of you know anything! Why aren't your hands up?'"

In view of these underlying attitudes, it is cruel to identify a child as gifted, and then place him or her in charge of a jealous teacher. The teacher should be chosen for impersonal interest in educational problems and for ability to maintain an unbiased attitude even toward pupils whose grasp may in some instances exceed her own. The teacher must, in short, be one who can tolerate being beaten occasionally by a child, in intellectual performances. It is told of the late Dr. Bowditch, that he retained throughout his life the painful impression made upon him, when as a young child he was punished by a schoolmaster for offering a mathematical solution which the master deemed outside the proper powers of his pupil.

Other necessary personal traits of the teacher are sense of humor, patience, and love of truth for its own sake. The teacher should be a person of very superior intelligence in order to gain and hold the respect of gifted pupils.

Aside from the endowments of original nature, the teacher should be thoroughly well educated. An unusually wide range of information must be at command, if resources in this respect are not to be under a constant strain.

V. MODIFICATIONS OF METHOD

It is generally agreed by those who have taught groups of the gifted, that certain modifications of method are desirable,

whatever the subject matter presented. These modifications can be derived by corollary from study of the psychology of these children as well as from the actual experience of the classroom.

The most conspicuous feature of modification relates to *drill*. Drill can be much reduced, below what is needful for the average child. Not only are many repetitions unnecessary for the very intelligent, but they are decidedly irksome. Nothing bores one so much as to hear over and over again that which has already been completely grasped and assimilated. Thus the acquaintance who repeats to us the same anecdote or joke comes to be referred to as a bore. In illustration of this point is the reaction of a young boy of extremely high intelligence quotient to certain instructions in the course of mental tests. The tests being administered called for repetition of the same question after each of five different items. When the standard question had been repeated for the third time, the child, obviously becoming restive, suggested that "it wouldn't really be necessary to ask that question so *many* times."

Although drill should be markedly reduced, this is not to say that it may be abandoned altogether. Mastery of spelling, of the four fundamental processes in arithmetic, of penmanship, and of various other essentials, is founded primarily upon drill, whatever may be the intelligence of the learner. The amount of repetition needed for given intellects, may be determined by setting up a goal in terms of standardized tests of achievement, and then by measuring proficiency in terms of these tests.[1] The results will indicate when drill has been sufficient.

Gifted minds are especially amenable to instruction by the

[1] There are various recent treatises in this special field. McCall's *How to Measure in Education* (Macmillan) is recommended.

project method, because they excel in "thinking things together," in perceiving the relations between and among all the relevant elements in a given field of endeavor. The outstanding weakness of the project method as it is used in the average classroom has been that the pupils emerge from instruction without speed or accuracy in use of the "tools" of learning — reading, writing, spelling, and arithmetic. Unless an amount of direction is given by the teacher, sufficient virtually to nullify the method, the relevance of these tools is not clearly enough perceived, nor is their mastery vigorously undertaken. Gifted children are by no means so subject to these weaknesses as others are, because in the course of any project they do much more incidental learning, are much more insistent on perfection of detail, and so require comparatively little specific drill. Also, they are naturally inclined to adopt projects which call for extensive use of the tools of intellectual learning. However, although the project method is well adapted to them, it cannot be relied upon to the exclusion of specific drill for proficiency in the "tool" subjects.

In recitation, the method of the seminar is feasible, even for very young gifted children, and is much enjoyed. They like to impart information to each other. They like to ask questions and to be questioned. The method of recitation whereby every child studies the same assignment, then closes the book and waits for the teacher to put questions upon material familiar to all, the answers to which are known by all before they are given, is especially ill-suited to the gifted, except in the routine learning of "tool" subjects. Projects in learning are particularly appreciated in which topics or parts can be assigned to individuals or to groups, who then report comprehensively to the class the results of study. Such methods involve the use of dictionaries and encyclopedias, "the search through old books," self-expression, the imparting of knowl-

edge genuinely, and the pleasure of informal discussion and questioning.

Until they are at least ten years old, the intellectually gifted do not commonly like written work as a method of recitation. This is because of the discrepancy between facility of ideas and facility of motor control, already discussed at length. "Oh, do we *have* to write it out?" is a plea often heard in the special class of young children. It is surprising how many of them learn to use typewriters during the early years of the elementary school.

VI. EQUIPMENT OF THE CLASSROOM

It may be said with much truth that there is nothing to be suggested for the equipment of a classroom for the gifted which should not properly be suggested also for the ideal classroom of children in general. However, certain features of equipment are particularly important for the gifted. Chief among these is the special library, which should be selected quite differently from the library for ordinary children of like age. In it should be included the reference books to be used in the work of enriching the curriculum, many volumes of poetry and of nature study, a complete set of some standard encyclopedia, two or three good dictionaries of the native language and of whatever foreign language is being studied, atlases, and maps. Upon this basis may be built up further increments in accordance with the financial resources available. This library may be managed by a librarian or a library committee selected from among the children.

Another important provision pertains to exhibitions of collections. There should be tables or shelves upon which the pupils may arrange their individual collections for display. This too may be regulated by the children themselves. In one such classroom exhibits of cones, of silk in various stages

of manufacture, of moths, of stamps, of butterflies, of stones, of leaves, of coins, of pictures of cathedrals, of rubber in various stages, and of alphabets were thus carried out. The child exhibiting usually wants to tell the class about his hobby. One school was able to give over a whole room, which was called "the hobby room," to the maintenance of collections.

In addition to the items of equipment already mentioned, microscopes, a piano, and a "round table" for discussion are valuable. The children will themselves bring numerous natural objects as decoration, the problem here being to limit rather than to stimulate the supply. A bulletin board will afford the means of bringing current events to attention. Pictures for the walls should be chosen by the children themselves after study of the subject, if this is feasible. Movable seats and desks have many advantages, in that they facilitate the formation of small groups for special study hours and permit space to be cleared on occasion. The only disadvantage of this movable furniture is that pupils accustomed to fixtures are likely to fall over the unstable seats and knock them down, thus creating some confusion until new habits can be formed. Still other articles, such as globes, phonographs, and the like may be introduced with profit. There is, indeed, no source of knowledge which will not contribute to the education of gifted children, if placed within their environment. In consideration of their liking for typewriters, one of these adds notably to classroom equipment.

VII. CRITERIA FOR ENRICHMENT OF CURRICULUM

Before additional instruction can be offered for the gifted, it is necessary to arrive at a justifiable theory of what knowledge is most suitable for this special purpose. At the outset it is to be recognized that there exist no objective criteria, by which to choose among all the phases of human experience

those most valuable for such a group. Nevertheless, we are not altogether at sea. Orientation may be derived from discussions of the school curriculum, by those who have given prolonged thought to it; from current and historic social problems; from conversation with gifted adults, who can be induced to give criticisms of their early education; and from the data of differential and developmental psychology.

We may note first a few negative considerations. It is useless to consider intensive work in classical languages or in mathematics, for instance, as a "general sharpener" or a "general discipline" of the minds of these gifted children. The education given should be such as will actually function specifically in their lives; such as will afford a rich background for fruitful assimilation of all that is to be met in life as it will be lived. Another negative consideration involves the avoidance of the subject matters which constitute the accepted curriculum of higher schools. Since we are here limiting our discussion to enrichment of the curriculum in the elementary school, we may say that there is nothing to be gained by anticipating the work of high school. To enrich the curriculum of the elementary school by teaching algebra, geometry, Latin, or zoölogy to young gifted children is to render them no genuine service, but is merely to anticipate matters which would have been presented to them in any case within a few years. The subjects of study taught in high schools can be learned by very gifted children, when they are nine or ten years old. But what profit is to be found in having this done? If a special curriculum for gifted minds were to be established in high school, and through college, also, so that articulation with the regular work of higher schools would be nowhere necessary, then we might shift high school subject matter about in whatever manner would prove most convenient. Such prolonged specialization of curricula seems scarcely

feasible, however, because after graduation from the elementary school, there is so much scattering into courses of study on the basis of diverse interest. For the present, in any case, we shall limit our considerations to enrichment in the elementary school, assuming articulation with high schools and colleges as they exist and change in the ordinary course of events.

Coming now to positive criteria, modern thought about education emphasizes preparation for life as it will be lived. The child should have brought to his attention whatever will most help him to adjust successfully to a civilized world, and at the same time to render the maximum service to others, of which he may be capable. We know that civilization depends upon the capable for innovations, for progress. Franklin K. Lane has given clear expression to this fact:

> Progress means the discovery of the capable. They are our natural masters. They lead because they have the right. And everything done to keep them from rising is a blow to what we call our civilization.

Others can conserve, but only the gifted can originate. Therefore, should not the education of the gifted be education for initiative and originality? But originality depends first of all upon knowledge of what has been done previously, and of how it has been done. To take their places in civilization, therefore, it would seem that the intellectually gifted need especially to know *the history and evolution of the life of civilized man.* At present this is not taught to children except in fragmentary and incidental ways anywhere in the elementary or secondary school and is not likely to be learned even in college as a systematic body of knowledge. Therefore, it constitutes a genuine enrichment of curriculum. Moreover, it would give an assimilative background early in life, as it seems should and could be done with young gifted children.

VIII. HISTORY OF CIVILIZATION FOR THE GIFTED

The activities which constitute the life of civilized man may be classified and designated in various ways. This has been done in several of the books later referred to in connection with this chapter. For instance, such topical classification may be made as follows: (1) food, clothing, and shelter; (2) health and sanitation; (3) communication; (4) transportation; (5) trade; (6) law; (7) government; (8) education; (9) science; (10) art; (11) philosophy (history of human thought); (12) institutions; (13) warfare; (14) labor; (15) recreation.

Each of these topics can be elaborated into a course of study, constituting in itself a "project" deeply interesting to a gifted child, as has been proved by experiment in the classroom. At Public School 165, Manhattan, such studies were successfully carried through, as an enrichment of the curriculum for very gifted children nine and ten years old. A few sample outlines followed in this endeavor will indicate the general trend of the ideas handled.

The topic of *Food* was studied approximately according to the following organization:

FOOD

1. Food of primitive man
2. Rise of agriculture
   a. theories concerning
   b. descriptions of implements, plants, etc.
3. Domestication of animals
4. Discovery and control of fire: cookery
   a. primitive methods of making and controlling fire
   b. evolution of fire-making — fuels, matches
   c. development and uses of cookery
5. Quenching thirst
   a. water supply
   b. other wholesome beverages
   c. harmful beverages

6. Preservation of foods
   a. smoking and salting
   b. drying
   c. canning
   d. refrigeration
7. Adulteration of foods
   a. methods
   b. dangers
   c. laws regulating
8. Sources of world's food supply
   a. animals other than fish
   b. fish and other sea foods
   c. plants
9. Foods of foreign peoples
10. Diet of modern man compared with diet of primitive man
11. Importance of nutrition
   a. diseases of malnutrition
   b. balanced diet
   c. famines
12. Food customs
   a. fasting
   b. feasting
   c. etiquette of eating
13. Ethics of food preparation and distribution in modern life

In pursuit of this project, visits were made to city markets, and to the distributing station of a large milk company. The following books were selected as suitable, and were placed for reference in the classroom.

Suggested Literature on the Topic of Food in the History of Civilization

Armstrong, Donald — *Food Facts;* Metropolitan Life, New York, 1922.

Bailey, Edgar — *Food Products from Afar;* Century, New York, 1922.

Ball, K., and West, W. — *Household Arithmetic;* Lippincott, Philadelphia, 1920.

Bishop, A., and Keller, A. — *Industry and Trade;* Ginn, New York, 1918.

Carpenter, Frank — *How the World Is Fed;* Am. Bk., New York, 1907.
Casson, H. N. — *The Romance of the Reaper;* Doubleday, New York, 1901.
Chamberlain, J. F. — *How We Are Fed;* Macmillan, New York, 1904.
Congdon, Leon — *The Fight for Food;* Lippincott, Philadelphia, 1916.
Farmer, A. N., and Huntingdon, J. R. — *Food Problems;* Ginn, New York, 1918.
Johnson, J. F. — *We and Our Work;* Boni, New York, 1923.
Large, Laura — *A Visit to a Farm;* Macmillan, New York, 1920.
Morris, Charles — *Home Life in all Lands;* Lippincott, Philadelphia, 1909.
New York City Department of Health — *Important Facts about Milk;* New York, 1920.
Olsen, J. C. — *Pure Food;* Ginn, New York, 1911.
Pierson, Clara — *Plow Stories;* Dutton, New York, 1923.
Quennell, M., and C. V. B. — *History of Everyday Things in England;* Scribner, New York, 1918.
Rocheleau, W. F. — *Geography of Commerce and Industry.* Educational Pub., New York, 1918.
Rose, Mary S. — *Feeding the Family;* Macmillan, New York, 1923.
Rosena, M. J. — *All about Milk;* Metropolitan Life, New York, 1922.
Rugg, H. O. — *Town and City Life;* H. O. Rugg, The Lincoln School, New York, 1922.
Smith, J. R. — *Human Geography;* Winston, New York, 1922.
Smith, J. R. — *The World's Food Resources;* Holt, New York, 1919.
Showalter, W. J. — "How the World Is Fed"; *National Geographic Magazine,* January, 1916.
Snyder, H. — *Human Foods;* Macmillan, New York, 1910.
Toothaker, Charles — *Commercial Raw Materials;* Ginn, New York, 1905.
United States Department of Agriculture — *Care of Food in the Home;* Bulletin No. 1374.
Vultè, H., and Vanderbilt, S. — *Food Industries;* Chemical Publishing Co., Easton, Pa., 1923.

Another topic, *Law,* not yet tried out experimentally so far as reported, might be outlined for study thus:

Law

1. Folkways
   a. examples of folkways among primitive people and among modern civilized people
   b. origin of folkways
2. Customs
   a. how customs differ: American customs compared with foreign customs
   b. what aspects of life come under custom? (birth, marriage, visiting, treatment of the old, treatment of the young, property, leadership, dress, food, etc.)
   c. etiquette: values of courtesy and manners
3. Statutes: codified law
   a. difference between law and folkway
   b. difference between law and custom
   c. when does a folkway or a custom become a law?
   d. examples of current laws, federal, state, etc.
4. History of law
   a. earliest laws — Egyptian, Roman, Greek, Hebrew, etc.
   b. famous laws
   c. great law-givers — Moses, Solon, Hamurabi, etc.
5. Career of the lawyer
   a. functions performed
   b. training undergone
   c. professional rewards
6. The law-breaker
   a. courts: municipal, circuit, supreme, military, juvenile
   b. trial, jury, counsel, etc.
   c. what kinds of people break the law? (statistics of the study of prisoners)
   d. punishment
7. International law
   a. World Court and its functions
   b. adjustment of international dispute
   c. future of law

From the enrichment of curriculum worked out by Superintendent French, the course on *Practical Banking* may be cited as illustrative of his plans. The course is given with the

following aims defined: (1) To give information as to why banks exist; of the nature and scope of their business; of their methods of transacting business; of the services which they render to the community; as to how banks make money; as to how banks assist their customers; and of the relation between the interests of the bank and its community. (2) To dispel the mystery surrounding banks and bankers. (3) To encourage early connection and coöperation with local banks. (4) To instil a spirit of thrift and conservation. These topics are outlined for study thus:

First week:

1. A brief history of banking, including a history of some famous banks.
2. History of money, the materials that have been used as money, and why gold and silver have come to be universally used as units of value.
3. History of the money of the United States, control of issue and coinage, where it is made, what determines its value, and why we use paper money.

Second week:

1. Organization of a bank: different kinds of banks.
2. Banking law. Supervision by governmental authority.
3. Officers of a bank; how chosen; duties and responsibilities.
4. Capital of a bank; how supplied; division into shares; stock certificates, their issuance, value, and transfer.

Third week:

1. Business of a bank.
2. Use of idle money.
3. Loans, exchange, and collections.
4. Inspection of local banks by children.
5. Basis of credit explained by a local banker.

These outlines suggest how the gifted child may be brought into touch with his environment, by understanding its growth from the primitive. Not only does such understanding prepare for adequate responses in adult life. The subsequent

work of high school and of college is illuminated in countless details by such study. An entire volume would necessarily be required, in order to present fully and systematically the topics and modes of treatment involved in the project of studying the history of civilization, as appropriate to young, gifted children. But first of all much work must be done experimentally in the classroom with all the various topics, as has been done at Public School 165, Manhattan, with *Food* and in the Drumright schools, with *Banking*. To work out, in all details, a single topic as a project, with the proper circumscriptions, visits, and the pertinent literature, is by no means a brief or easy task. Thus we may expect that it will be some time before authentic guides to such study, founded upon genuine experiment with the gifted in the classroom, can be published. At present we can but urge the need of experimentation in this field to find out what is appropriate and what is not.

IX. EXPERIMENT WITH AN INTRODUCTION TO BIOGRAPHY

For many reasons, the study of biography would seem to be especially appropriate in the education of gifted children. We have said that the child should have brought to his attention whatever knowledge will most help him to adjust himself successfully to his world. From researches in differential psychology, we can now predict that children standing in the best percentile for intellect at the age of eight to ten years, will continue to occupy the same relative position as adults. They will be capable of that extraordinary service of intellect which may result, if other personal traits are favorable, in professional, scientific, and artistic eminence, and in moral leadership. For adjustment to life as they are capable of living it, they need information as to how persons have found adjustment, as to how careers are made and are related serv-

iceably to civilization, and as to all the various kinds of intellectual work required by the world in their day. Also, they need ideals of sustained effort against odds, of perfection in work, of altruism, and of self-management which arise from close contemplation of the noble. An introduction to biography is not presented as an integral feature of the usual curriculum in any of its parts. Therefore, it would constitute a genuine enrichment of the elementary school curriculum and not merely an anticipation of the offerings of the secondary school or college. It is to be considered, too, that attitudes and ideals formed in childhood holding the advantage of priority, have a special importance in the subsequent life of the individual.

At Public School 165, Manhattan, an experiment was conducted beginning in 1922, to learn how young, gifted children respond to the study of biography. Twenty-six children, all testing above 150 IQ (Stanford-Binet), between the ages of eight and ten years, with a median mental age of fifteen years, were given an opportunity to study the lives "of interesting persons who really lived." Although there was no compulsion of any kind, the opportunity being offered only to those who might care to take it, every child in the group expressed the desire to participate and did so. The "seminar" method of presentation was used. Each child selected according to his own interest some "real person" whom he wished to bring before the class. The child then collected from various sources whatever information he considered significant about the person chosen, and formulated an account which was written and read, or told without writing, to other members of the class. Each presentation was followed by questions and discussion, conducted by the child who made the report. In a class of this character, it is highly undesirable for the teacher to dwell at length upon the inspirational features of the "lives

and deeds," or to point many morals. The children appreciate these things keenly enough, and are sufficiently inclined to hero-worship without urging. Stimulation of the emotions is to be tactfully avoided by elders.

It was originally intended to terminate this project at the end of one semester's experiment, as the purpose was not to exhaust the field of biography but to give an introduction to it and to establish certain points of view concerning eminently valuable lives. However, when school convened in the autumn following, these pupils asked that the study of biography be continued, and upon being told that the teacher who had been with them for the purpose could spare no more time, asked, thereupon, that they be allowed to continue under the guidance of the classroom teacher. This was allowed, the project now being connected with the required work in English composition. The interest of the children extended even into a third year, so that altogether they continued the study of biography, on their own initiative, for two school years after the term originally intended to be given to it.

During this time, lives of the following interesting persons were presented to the class:

James Monroe	Edward Bok
Andrew Jackson	General Sheridan
James Garfield	Robert Fulton
Andrew Carnegie	Warren G. Harding
William McKinley	Joan of Arc
James Madison	William Penn
Helen Keller	Richelieu
Marie Antoinette	Louisa Alcott
Titian	Washington Irving
George Eliot	J. F. Millet
Charles Dickens	Samuel Morse
Samuel Clemons	William Shakespeare
General Pershing	Joseph Haydn

Louis Pasteur
Julius Caesar
Cyrus H. K. Curtis
George Washington
Alexander Hamilton
Benjamin Franklin
Lord Lister
Napoleon
Mohammed
Theodore Roosevelt
John Paul Jones
Alexander the Great
Stephen Douglas
William Taft
DeWitt Clinton
Michael Angelo
Abraham Lincoln
General Sherman
The First Duke of Marlborough
Thomas Edison
George Bessemer
Luther Burbank
Marie and Pierre Curie
Ulysses S. Grant
Queen Victoria
Beethoven
Robert Louis Stevenson
Rudyard Kipling
James M. Barrie
Thomas Jefferson
Zachary Taylor
George Westinghouse
Daniel Boone
F. P. Steinmetz
Sarah Bernhardt
Horace Mann
Peter Cooper
Franz Liszt
Ignace Paderewski
Grover Cleveland
Alexander Graham Bell
John Audubon
Louis Agassiz
Florence Nightingale
Rosa Bonheur
Woodrow Wilson
Eugene Field
John Milton
Horace Greeley
Franz Shubert
H. W. Longfellow
John G. Whittier
William Marconi
Anna Howard Shaw
Ezra Cornell
S. S. McClure

It is noticeable that these names happen to lead into almost every form of intellectual endeavor in a civilized world and to a great many different nations. It is evident that a study of the lives of eminent persons ramifies into practically every branch of knowledge and coördinates with all the other work of the classroom, where gifted children are concerned. This becomes clear from the questions raised during discussion of the various careers. Questions relevant to physiology, bac-

teriology, geography, physics, ornithology, medicine, chemistry, music, art, commerce, speech, education, and history were especially frequent in the particular class here observed.

As in all attempts to enrich the elementary school curriculum for young, gifted children, one of the chief difficulties in the study of biography is the present dearth of suitable books. Biographers are too frequently sentimental, vindictive, verbose, or unscholarly in point of view. Autobiographies are, on the whole, more satisfactory than biographies. The following books have been found suitable, in varying degrees, for the needs of children eight to ten years old, who test above 150 IQ (Stanford-Binet). Such lists of reference may be varied indefinitely, according to interests and preference. The list suggested represents a considerable variety of achievements, from different national groups, in various periods of the world's history, and takes heed of both boys and girls.

Suggested List of Biographies

Barrie, J. M. — *Margaret Ogilvy: By Her Son.* Scribner, New York, 1923.

Carnegie, Andrew — *Autobiography* (Popular edition); Houghton, Boston, 1923.

Caldwell, O. W. and Slosson, E. E. — *Science Remaking the World;* Doubleday, New York, 1923.

Curie, Marie — *Pierre Curie;* Macmillan, New York, 1923.

Darrow, F. L. — *Masters of Science and Invention;* Century, New York, 1923.

Dukes, Cuthbert — *Lord Lister* (Roadmaker's Series); Small, Boston, 1925.

Garland, Hamlin — *A Son of the Middle Border;* Macmillan, New York, 1917.

Hinsdale, H. A. — *Horace Mann.* Scribner, New York, 1900.

Keller, Helen — *The Story of My Life;* Doubleday, New York, 1903.

Kelly, H. A. — *Walter Reed and Yellow Fever;* Norman Remington, Baltimore, 1923 ed.

LINFORD, MADELINE — *Mary Wollstonecraft* (Roadmaker's Series); Small, Boston, 1924.

MACDONALD, J. RAMSEY — *Margaret Ethel MacDonald;* Seltzer, New York, 1924.

MASSON, R. — *I Can Remember Robert Louis Stevenson;* Stokes, New York, 1922.

MEADOWCROFT, W. H. — *The Boy's Life of Edison;* Harper, New York, 1921.

MCCLURE, S. S. — *My Autobiography;* (Magazine Publishers), New, York, 1925.

PAGET, S. — *Pasteur and after Pasteur;* Black, London, 1914.

PARKMAN, M. R. — *Conquests of Invention;* Century, New York, 1923.

PROUT, H. G. — *A Life of George Westinghouse;* Scribner, New York, 1922.

RANDELL, W. L. — *Michael Faraday* (Roadmaker's Series); Small, Boston, 1924.

RIIS, JACOB A. — *The Making of an American;* Macmillan, New York, 1901.

TARBELL, IDA — *The Boy's Life of Lincoln;* Macmillan, New York, 1921.

WASHINGTON, BOOKER T. — *Up from Slavery;* Doubleday, New York, 1906.

WYATT, R. B. H. — *William Harvey* (Roadmaker's Series); Small, Boston, 1924.

After the children of the special class had carried on the study for a year, on their own initiative, they were asked to write upon the question, Why did you want to continue the study of biography? After they had thus carried it on for a second year, at their own request, they were asked to take as a topic in English composition the question, Should children study biography in school? These questions elicited unanimous response to the effect that children should study biography in school. The reasons for wishing to continue with the work may be summarized chiefly under a few headings: (1) is interesting and enjoyable; (2) gives useful knowledge; (3) helps in other studies; (4) gives inspiration to accomplish

things; (5) gives the pleasure of searching through many books; (6) teaches how people achieve great things.

Biography, the study of the lives of people, is interesting as well as educational. A period of biography may be more wisely and just as properly spent as a period of ordinary history or science.

Biography tends to make history more interesting, as it makes known the true character of different people — how and why they did certain things, above all why they were successful and why their doings are of benefit to the world.

You see everybody succeeds in his or her own way, and so will you.

I feel that even laying aside the immense enthusiasm which it creates in the student, which is the most necessary thing to have in studying any subject, that its correlation with other studies in itself should be enough to justify its study by the younger generation.

The study of biography is good in the following ways: (1) The study of biography is very educational; (2) We can mold our lives upon the lives of the ones we biography[1]; (3) It is very interesting.

Studying biography is an interesting way of learning history because it teaches us about great statesmen and important deeds without being a dull list of facts.

. . . For all these reasons, I truly believe it would be a great help to mankind if everybody knew about many great people which have been of some service to the world.

The study of the lives of the great is quite as important as other subjects taught in schools today. Surely it is just as necessary to learn of the deeds and character of famous men and women as various other studies. Besides the intrinsic value of biography, other studies can be correlated. Biography Marconi, and science is learned; Lee or Grant, and history is brought in; while literature can be learned in almost any biography of a writer.

When one reads the biography of a great man like Edison or Lister it encourages man to a higher standard and makes one want to do something.

The above comments were made by the children of the experimental class, when some were ten and some eleven years old. If they seem unlike the comments of children, it is to be remembered that at this time the median intelligence of the group was much more highly developed than that of the aver-

[1] The children coined the verb "to biography," pronouncing it *bi-og'ra-fi'*, and used it frequently.

age adult. The form and content of the statements throw an interesting light upon the thought processes of such children.

From the reaction of the children, and from the quality of work done, the investigators were convinced by this experiment that young gifted children of mental age past fourteen years become very much interested in biography and that they profit from it in such a way as to justify its inclusion in their curriculum.

X. OTHER SUGGESTIONS FOR ENRICHMENT OF CURRICULUM

Aside from the study of civilization and of biography, various other suggestions for the special education of the gifted have been brought forward. Coy introduced the study of Greek architecture into the course of the children in the experimental class in Columbus, with good results. The study of a foreign language offers interesting possibilities. If a modern foreign language be mastered in the elementary school, it becomes possible for the child to enter college with use of two languages other than his native tongue. He can then employ the languages as *tools* of learning in college, instead of spending his time in acquiring them there. Young children readily learn to speak and understand a foreign language. Young gifted children also learn the grammatical construction. The experimental class established at Public School 165, Manhattan, entered high school with a considerable facility in conversational French, as an enrichment of their elementary school curriculum.

Special work in the appreciation of music, and of the graphic and dramatic arts, is also to be considered in the program to be offered for intellectually gifted children. Although it has been shown that such children are no more and no less gifted in music and in representative art than unselected children are, nevertheless they may well become an important factor in

the patronage of art and very possibly may derive great satisfaction from training in æsthetic appreciation. Special training in the arts should, of course, be given early to those children who are gifted with special artistic talents.

In Okmulgee, Oklahoma, "broadening and finding courses" are offered in such a way that the gifted pupil in the junior high school may readily find a variety of enrichments. The bright pupils are placed in "enrichment classes," where they both progress rapidly and find extra work to do. Broadening and finding courses are exemplified by Latin, English, electricity, nursing, and printing. An especially valuable and interesting feature of the work in Okmulgee is the organization of clubs among the pupils to study various topics, such as ancient history, camp cooking, plant experimentation, cartoons, sanitation, costume, manners, handiwork, and mythology. During the years preceding 1925, seventy-seven of these clubs were active in the Okmulgee schools.

In the Thomas Jefferson Junior High School of Cleveland, enrichment courses are at present being definitely formulated by experimental procedure.

XI. SAMPLES OF ACTIVITIES IN A SPECIAL CLASS

Verbatim transcription gives a much better idea of the activities of a special class than do general remarks. The following brief transcriptions illustrate some of the problems of discipline and of range of information on the part of teachers and show at the same time the power of reasoning and the eagerness for interchange of ideas on the part of the children.

TIME. *10:30 to 11:00 A.M.*

PLACE. *A classroom.*

GROUP. *Special Opportunity Class of twenty-six children, of a median birthday age of 10 years 4 months, ranging from 9 to 11 years, with IQ range from 150 to 190. Special Teacher and Classroom Teacher.*

SPECIAL TEACHER. Now I want you children to keep busy.

[*Special Teacher leaves room. Observer enters. Classroom Teacher goes to the rear of room with some work. Observer goes to rear of room and removes wraps. There is a buzzing of talk among children. Children Le, Lo and Ma approach Observer, and begin to talk all at once, each about his or her work. Child Le exhibits a piece of work.*]

CHILD MC [*in front of room, acting as monitor*]. One, two, three, four —

OBSERVER [*to children addressing her*]. Now, all be seated, for I have to write.

[*Children obediently go to their desks. All children gradually become quiet, as Child Mc counts ten. About four minutes have been consumed.*

Special teacher returns. Child Mo enters with him, from another Special Opportunity Class. Child Mo takes his place in the front of the room ready to address the Class. Special teacher admonishes Class not to talk unnecessarily. Children in attitude of attention toward Child Mo.

Child Mo reports on Modern Water Supply, talking for about twelve minutes. Talks of sources, purification, and acqueduct engineering; then concludes report.]

CHILD AL. What did you mean by "they" in the first of your report?

CHILD MO. I meant the engineers.

CHILD AL. What engineers? City or state?

CHILD MO. The engineers of the city.

TEACHER. What is the relation between city government and federal government in this matter of water supply?

CHILD KR. Let us make a mental note of that. Why do we always go off into other topics? That is really a matter of government.

TEACHER. Yes, make a note of it.

CHILD AL. Where is the Roosevelt Dam?

TEACHER. In Arizona, I think. [*To Classroom Teacher, in rear of room*]. Is the Roosevelt Dam in Arizona?

CLASSROOM TEACHER. I think so.

[*Several children speak together, in reference to the location of the Roosevelt Dam.*]

TEACHER. Children, do not all speak at once.

[*Discussion takes place about aërating water and placing iodine in it.*]

CHILD ST. I think they put charcoal and gravel into the bottom of the water; and it passes through them as it goes into the pipes, so that it is purified.

CHILD ALX. But why doesn't it then carry sand with it?

CHILD ST. The sand is packed.

TEACHER. Go to the board and show us how it is, St.

[*Child St goes to board, makes a diagram, and elucidates the plan of filtration through sand.*]

CHILD ST. Once in a while they change the sand and gravel.

TEACHER. Does well water in the country have to be purified? [*Many hands wave in air.*] Let Alx answer.

CHILD ALX. I can't.

CHILD MC. It goes through the ground, and that purifies it.

TEACHER. Is that the only way of filtering water? Let Ma answer.

CHILD MA. By chemicals, but I don't know what the chemicals are.

CHILD KR. Copper sulphate is used.

TEACHER. Can that be right? Copper sulphate is used on plants to kill insects. It is poison.

CHILD AL. They tie the chemicals in a bag, and drag it around to purify water.

TEACHER. Yes, but what are the chemicals used?

CHILD PA. They might use nitrate. That purifies.

CHILD KR. Let us make a note of it. Why do we waste time?

TEACHER. Make a note to find out. Copper sulphate doesn't sound right to me, for it is poison.

CHILD AL. In my science book at home I have the name of the chemicals, under the picture, and can look it up.

CHILD KR. Same here.

[*Several questions are asked, too rapidly for recording.*]

TEACHER. How many have had water from country wells?

[*Several children raise hands.*]

TEACHER. How many found sand in it?

[*All hands lowered, except that of Child Eu.*]

TEACHER. Only Eu. The others didn't see any. There was so little in it that it couldn't be seen.

CHILD AL. The *best* way to purify water is to *boil* it, because filtering will not take out germs — only sediment.

TEACHER. Yes, it must be boiled to kill germs.

CHILD MA. Some people think ice water has no germs. But ice doesn't kill germs. It only puts them to sleep.

TEACHER. Yes, ice water may have germs in it. Are there any other organisms that can be put to sleep by cold?

CHILD KR. Yes, some kinds of fish can be put to sleep in ice and not be killed.

TEACHER. Also the frog. Now, what about the city water supply? You say it must be pumped? [*addressing Child Mo*].

[*Child Har talks, interrupting. Observer does not catch what was said.*]

TEACHER. Har, what did I tell you about talking out? Do you remember what I said?

[*Child Har nods. The others look at him.*

Child Lo is called on, as he raises his hand. He attempts to explain that our city water is pumped from the Catskill reservoirs.

Teacher goes to board, and explains diagrammatically the flowing of water.]

TEACHER. Does it have to be pumped?

CHILD CH. No, sir. When it flows *down* one hill, it gains enough momentum to go *up* the next hill, and so it gets to us.

[*Much waving of hands. Several children burst out talking.*]

TEACHER. Let us have a little quiet here. Ch, what do you say?

CHILD CH [*continuing*]. It is *forced* to the city — *not* pumped.

TEACHER. How forced?

CHILD AL. Water seeks its own level. If you take a test tube that is bent, water from one glass will seek its own level in another glass. Won't it also seek its own level in the city?

[*Several children burst out, agreeing with this.*]

TEACHER. Now here are one, two, three, four, five children talking all at once. Can each child tell all about it? What do you say, Th?

CHILD TH. In science class I saw the water rise.

CHILD ALX. Now, is that because water *runs* to its own level by momentum or because water behind is *forcing* it forward?

TEACHER. Because water behind is forcing it.

[*One of the girls makes a remark, not caught by Observer.*]

TEACHER. Boys know more about physics than girls do.

[*Discussion continued at a rate too rapid for transcription.*]

CHILD MC [*addressing teacher*]. Some time ago there was a queer tasting chemical in the city water. What was it?

CHILD DOR. Why was it, Mr. ——, that when that was, some localities didn't have it, but others did?

CHILD WI [*raising hand*]. Because, perhaps, some parts of the city got water from the Croton reservoir, but others didn't.

TEACHER. Yes, I think that is the case.

[*In the meantime, Child Mo has been standing silent in the front of the room, listening to the discussion.*]

TEACHER. It is, perhaps, hardly fair to criticize Mo's report, as he doesn't belong to this class. Does anyone want to make any comment though?

[*Many children raise their hands.*]

CHILD AL [*speaking by permission*]. I think it was good.

CHILD CH. If any children wish to learn more about this, there is a whole section given up to our water supply down at the museum.

TEACHER. Is that so? That is interesting. Maybe we could see it sometime. I will speak to Miss ——.

CHILD HO. I read that our water supply here costs one penny a day for each person.

TEACHER. How much per day is that for all?

CHILD MA [*calculating rapidly with pencil and paper*]. About $50,000.

TEACHER. I am not sure your figure is right, but anyway we will have to stop for today.

[*Child Mo retires to his own classroom. Special Teacher goes to rear of room, where three pupils run to him to pursue the discussion. Classroom Teacher takes charge. Observer leaves room.*]

The following spontaneous classroom discussions, chosen at random from hundreds, illustrate the formulation of concepts in debate by members of the same class mentioned above, and also the way in which such children are served by incidental learning.

IS ARMOR CLOTHING?

CHILD KR [*IQ 190*]. Is armor to be considered clothing?

CHILD BR [*IQ 148*]. No. Armor is to be considered an instrument of warfare. It is worn *over* clothing.

CHILD H [*IQ 154*]. Whatever is *worn* is clothing.

CHILD DO [*IQ 188*]. The knights wore their armor more and more, till finally they wore it when not fighting at all. So it *became* clothing.

CHILD KR [*IQ 190*]. They wore the armor as court *dress*. When we went to the museum, we saw armor, which we were told was the court *dress* in Queen Elizabeth's time.

[*Class concludes that armor must be regarded as clothing.*]

ARE RUGS FURNITURE?

CHILD DOR [*IQ 167*]. Are rugs furniture or objects of decoration?

CHILD TH [*IQ 171*]. They may be considered either way. In one way

rugs are furniture, because they are *useful*. They keep cold from coming up through the floor. However, they are also decorative, for if we wanted them only to keep out cold, we could buy just *plain* rugs. We buy them to be decorative, so people will want to come to our house.

TEACHER. Could we divide all furnishings into useful and decorative? What of chairs, beautifully carved? Are they necessities or luxuries?

CHILD Do [*IQ 188*]. They cannot be put under either head absolutely correctly, because they are *both* necessary and luxurious. They are furniture and *necessary*. They are decorative and a *luxury*.

CHILD M [*IQ 156*]. People buy beautiful things because their neighbors do. They try to keep up with their neighbors.

CHILD B [*IQ 150*]. Yes. "Keeping up with the Joneses."

[*Class concludes that it is impossible to divide all things arbitrarily into furniture and not furniture, or into necessities and luxuries.*]

How Long Have Springs Been Used in Furniture?

TEACHER. How long have springs been used in furniture? [*Child Ar raises his hand*]. Are you going to guess, Ar? Or do you *know?*

CHILD AR [*IQ 137*]. I *know*. Since Simmons began making spring beds in 1869.

TEACHER. How did you learn that?

CHILD AR. Because every time my mother shakes up the mattresses, I can see that statement on the springs. It has their *guaranty* on it.

XII. PRESENT PROBLEMS

The difficulties to be met in working out a detailed curriculum suitable for gifted children in the elementary school are numerous, but surmountable. At present we lack classroom teachers trained for experimentation, we lack administrators who wish to undertake pioneer tasks, and we lack suitable literature on the subjects and possible projects which suggest themselves as appropriate to the needs of gifted children. All of these major obstacles to progress in this field will tend to disappear. Teachers are being trained in the principles of

experimental education. As many administrators as are needed for pioneering will soon have come forward, for only a few pioneers are called for in any work. A suitable literature and a feasible plan of procedure will be formulated gradually from daily life in the experimental classroom.

If it be accepted that the projects of study herein suggested are suitable for young gifted children — the history and present status of the life of civilized man, the biography of eminently valuable persons, appreciation of the arts, early mastery of foreign tongues — then it is true that hardly any thoroughly appropriate materials of instruction are available in prepared form. Books on every topic are being constantly published, but inspection will reveal that many of them are written for the technical expert, in highly specialized vocabulary; many treat at great length of some detail; while many are printed in type unsuitably sized and spaced for perusal by young children. Books intended for the information of the nontechnical reader on such topics, for example, as money, textiles, fuel, adulteration of food, bacteria, sanitation, history of education, evolution of fire-making and control of fire, water supply, agriculture, are far to seek. To prepare such material for young, gifted children calls for the art of clear, nontechnical literary presentation, coupled with expert knowledge of the topic in hand.

Professional teachers have seldom supplied books or articles which can be used for the purposes at present under discussion, but purveyors of commodities, who have built up famous businesses, are found in numerous instances to have fostered the collection of valid information in their particular fields, and to have published such information in form to be comprehended by the public which they serve. For instance, an excellent history of the typewriter and its rôle in human affairs has been prepared and published under the auspices of one of

the great manufacturers of typewriters. Similarly, the history of the saw, with remarkable illustrative material, is available at the hands of a company which makes a famous saw. The history of fur in clothing, the history of refrigeration and of the manufacture of ice, facts about lumbering, and many other kinds of information may be obtained from dignified business houses in simple, readable form, free, in content, from matter advertising the particular brand of commodity.

XIII. GENERAL CONSIDERATIONS

Terman has formulated the general considerations immediately governing the mental hygiene of gifted children as related to training, stressing many of the following points: Special attention should be given to social development and play, in order to prevent the child from becoming too bookish or "old in his ways." Play with other children is also a good preventive of egotism, in cases where self-feeling tends to run high. The temptation to exhibit the gifted child should be consistently resisted by relatives and by teachers. He or she should not be placed in a position which will be a constant stimulus to live up to the rôle of child prodigy.

Special attention should be paid to the development of industrious habits. Since intellectual work is so easy for them, gifted children are under the temptation to "skim" their assigned tasks and to expect an effortless existence. "The remedy is for home and school to set a higher standard of school performance for such children." How this may be accomplished has been indicated in our discussions of experimental education.

Intensive training in early childhood is undesirable. We have noted the regret expressed by Mill, in speaking of his intensive education. Information should be given when called

for, and the child should be helped to help himself. Terman says —

> The gifted child is usually impatient to know the why and wherefore of things and will not rest until his curiosity has been satisfied. This is the opportunity of parents. Knowledge acquired when it is wanted is like food eaten when one is hungry. It is quickly assimilated and becomes a part of the mental structure. Parents who take the innumerable questions of the child seriously and answer them as fully and truthfully as his intelligence will justify, or as their own information will permit, are satisfying the most important of the child's educational needs in the pre-school period.

The child should be encouraged to think and act for himself. Hobbies have a very great educational value, particularly such as involve collections of natural objects or objects of current use, such as stamps, coins, and the like. Hobbies should be fostered and encouraged, but should be allowed to wane when interest is no longer spontaneous. As long as a child pursues a valuable hobby on his own initiative, his collection should not be treated with disrespect by his elders, although it may become something of a nuisance through occupying space or being dirty.

Of special importance is access to books. Terman has prepared a special reading list of several hundred titles, classified according to subject matter and according to the age at which each book is likely to be preferred by a child of superior ability. However, reading should not absorb all of the child's leisure. The environment should provide plenty of materials for manipulation, for construction, and for designing. A gifted child of six years, asked whether she would prefer the city or the country, replied, "The country — first because in the country you can handle and take what you see, but not in the city, and then because in the country you can go alone and take walks and run, and then because in the country everything smells good." Freedom to wander and to manipu-

late was here highly prized. The environment should provide for both.

As another general consideration of education and mental hygiene, the question has been raised and argued as to whether the gifted should know their IQ rating, or less specifically, whether they should be informed of their intellectual status. There is no agreement among educators on this point. Before the "mental age of discretion," it is conceivable that a bright child might be harmed by being told of his or her superior gifts. The child might decide that he need not work much, or he might become conceited. On the other hand, such information might encourage a gifted child, unfavorably situated in life, to place confidence in himself and to try for remote goals at which his capacity would entitle him to arrive. In any case, children of intellectual acumen eventually learn that they are exceptionally able, just as they learn other facts about the universe.

Probably all we ought to say about this matter at present is that there are children who should be told their intellectual status, while others will fare better if not told. The decision in each case would properly depend upon the child's disposition toward himself and others, and the circumstances of his case. As for gifted adults, there seems to be no good reason why they should not in all cases be informed of mental status as revealed by tests, just as they might be informed of their physical condition.

In telling a child or an adult his intellectual caliber, as determined by test, it is clearly wiser not to speak in technical terms. These are almost certain to be misinterpreted by the inexpert. For example, a mother being told that her child's intelligence quotient was 100, was convinced that her child had "perfect intelligence." Thus it is better not to mention the IQ, but to say that the individual stands in the best one

per cent of the population, or in the best one-half of one per cent, and so forth, as regards intelligence. Such terms are readily comprehended by the gifted, after a few minutes of explanation.

Finally, all the principles of mental and physical hygiene which apply to children generally, apply also to the gifted. These principles need not be presented here, as they have been discussed repeatedly in excellent treatises on the subject of mental and physical health.

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CHAPTER XII

Social-economic Implications

I. THE SOCIAL FUNCTION OF GIFTED PERSONS

He who analyzes the history of civilization comes readily to understand that each increment has originated in an individual intellect. The history of civilization is analyzed, however, by very few persons in any generation. The established curriculum of the schools does not, as has been pointed out, undertake such analysis, and so it is that the majority of mankind has either no ideas or but vague and erroneous impressions of the way in which contemporary social and economic institutions have been evolved. It is dimly supposed that "God made them," or, less naïvely, that they have "grown out of the collective experiences of all humankind."

There is at present no good medium available for general enlightenment in this field. Historians, like Robinson, have set forth clearly enough the functions of gifted intellects in the growth of civilization, but only the few persons in each generation who have special interest in the subject are likely to come into contact with these abstract expositions. Biography well written and authenticated affords a good approach to the understanding of the way in which civilization rises from the selective thinking of a few persons; but biography is seldom well written or authenticated, as it exists in printed form to-day.

Among those who have a correct comprehension of the part played by exceptionally intelligent people in making our world what it is, there has always been controversy as to the value to be placed upon gifted minds. Most often the view is ex-

pressed that gifted minds have a positive value beyond all price, for the population in which they occur. Terman, for example, believes that this is so.

> It should go without saying that a nation's resources of intellectual talent are among the most precious it will ever have. The origin of genius, the natural laws of its development, and the environmental influences by which it may be affected for good or ill, are scientific problems of almost unequalled importance for human welfare. Many philosophers and scientists, from Plato and Aristotle to the present day, have recognized the truth of this.

Thinkers who thus take a wholly optimistic view of the social function of the gifted, have in mind the inventions and discoveries that differentiate man's life benignly from the life of other animals — ethics, law, government, machinery, medicine, surgery, and countless other categories and sub-categories of thought and action. Seen in this light, the social function of gifted persons appears wholly good, and the multiplication of their numbers seems highly desirable.

It is possible, however, to maintain that the function of the intellectually gifted in society has been fully as malignant as it has been benign, for human welfare. This view we find set forth recently by Russell, in *Icarus*, and by Haldane, in *Daedalus*. Has there not been too much invention and discovery, to be happily sustained by the mass of mankind? Perusal of the daily newspapers shows the extent to which men are being injured and killed by chemical and mechanical inventions. War offers on a grand scale an illustration of the uses to which explosive powders, gases, and dynamite, invented by superior minds, have been put. The discoverer of the typhoid baccilus not only enabled sanitary engineers to prevent disease but also supplied at the same time a means whereby murder may be subtly and safely undertaken.

Invention in the realm of ideas stands in the same questionable case. For instance, have not superior intellects devised

too many and too intricate laws? Are not statutes becoming so detailed and all-pervading that only the steadiest can suffer their restrictions, and only the most intelligent can learn them? Will not inventions in the fields of law and morals eventually make delinquents of all but a few? So far from promoting human welfare, have not gifted thinkers furnished mankind with the instruments of eventual degradation and destruction? To those who meet this question with an affirmative reply, it seems doubtful whether the increase of gifted individuals should be sought, unless some means may at the same time be instituted of changing their present relation and ratio to the vast majority of human beings.

These two divergent points of view have been presented here not for the purpose of indicating choice between them, but merely to call attention to the lack of unanimity which prevails among informed thinkers, regarding the ultimate values of social-economic functions which gifted minds perform. We cannot here decide whether civilization is finally promotive of the happiness of the race. But we can perceive that government, industrial organization, medicine, surgery, law, education, and other products of man's intellect are greatly valued to-day by a majority of people. They are cherished by thousands, who can give no accurate account whatever of how the phenomena of learning originate. The constant influx of the population into cities, away from the more primitive conditions of rural life, is one concrete evidence of this fact. Thus, if the mass of men could clearly comprehend the true origin of advancement in civilization, doubtless gifted persons would be generally prized and explicitly rewarded.

II. ANCIENT METHODS OF CONSERVING THE GIFTED

In spite of prevalent ignorance concerning the history of civilization, there is in every generation a large number of

persons who perceive the value of the exceptional mind in contemporary dealings. Men feel the need of gifted thinkers whenever personal or community emergencies arise. *Advice* is being earnestly and constantly sought. Especially for purposes of government, defense, religious intercession, and relief from pain, men need and seek with all their might for good thinkers. Power comes to those who can act ably and give general satisfaction in such matters. In older countries, those who came to be identified as able, in the trials and difficulties of life, were given particular designations, known as titles, with accompanying emoluments. Kings, princes, dukes, lords, barons, and the like were instituted. The *Domesday Book*, for instance, conveys a definite idea of the existing classification of men, at the time records were established in medieval England.

It is not altogether clear just how titles became hereditary. The custom originated, of course, in human psychology. It may have been due primarily to parental pride and affection, to perception on the part of the populace that like begets like, or to a mixture of various psychological factors.

However it may have come about, we know that the principle of the hereditary title is found even among tribes which are still too savage to have written archives. When the chieftain dies, his son becomes chieftain. Inheritance of royal and noble titles, by blood kin, in line of direct descent or ascent, and then in line of collateral descent or ascent, in a strict sequence of probability, according to relationship and sex, became firmly established as a human institution, and persisted in Europe, Asia, and other parts of the world for hundreds of years unshaken. Within the past century, the institution of hereditary title, duty, and privilege has received severe shocks, and is now rapidly disintegrating. Why is it that this ancient attempt to conserve gifted persons for special

functions is failing? Do the laws of biological heredity, which we have discussed, fail in human practice?

Probably the principle of the hereditary title would not have failed if all that is now known about biological heredity had been perfectly applied. In the institution of hereditary caste, there has never been an application of biological laws but merely an awkward and vague attempt to apply the general principle that like begets like. In the ancient methods of conserving the gifted, some of the biological laws of heredity were violated.

We have noted that the offspring of a gifted parent vary among themselves, and as a group regress toward the mean of the general population. The chances are few that any child of a very great man will equal the father in capacity, and fewer still that a particular one, designated before birth, will be his equal. Yet hereditary titles descend to the eldest son, if there is a son who lives; and failing that, to kin in a prescribed order, determined by factors irrelevant to mental ability.

Hereditary office might have been a socially and politically successful device, if responsibility had descended not to kin in sequence prescribed by irrelevant accidents but in each case to the most intelligent one among kin in the first degree, regardless of order of birth and of sex. However, in past centuries there existed no scientific methods of appraising human faculty without trial by life itself. So primogeniture and preferment of males were set up, for reasons unconnected with display of ability, in ignorance of the fact that such determinants, being biologically irrelevant to capacity for selective thinking, would work steadily toward intellectual mediocrity in rulers and guides, even though both parents were required to be of royal or noble status. *The best one* among offspring should rationally have been selected for the hereditary office and title, instead of the eldest male.

Another weakness of attempts to conserve the gifted by means of caste has been that no allowance was made for the overlapping of ability between children of parents in different occupational levels. No such allowance could be made for the reason that no scientific method of appraisal had become available.

By the method of mental tests we have now learned, as set forth in Chapter III, that there is a small amount of overlapping even between offspring of miners and of lawyers — two occupations calling for very different degrees of intellectual ability. Inferentially, by variation from parental average, a small percentage of the children of nobles in each generation should fall automatically out of the parents' caste; while at the same time a small percentage of the offspring of peasants should rise into the noble caste. By "should" is here meant, in order to maintain a given standard of ability within a caste. Unless some means be provided to allow for this variation and overlapping of offspring, caste established originally on a basis of biological merit is sure to decay eventually, by regression to biological mediocrity.

In many of the countries where hereditary titles are or were sanctioned, there has been explicit provision for the rise of gifted adults on the basis of proved merit. But there seems nowhere to have been provision for the formal fall of the inferior or the mediocre on the basis of observed incapacity. A man might be stupid to imbecility, but he would remain royal or noble, if he were born into that status, and he could transmit royalty or nobility to his offspring. Thus the chief weaknesses of the attempt to conserve the able by the device of caste are that no means is provided for the automatic reduction from status of lower deviates from the caste norm; for the selection of the most able one among offspring, in succession; or for the identification and fostering of the fortunate

deviates among children of parents who are not themselves of high caste.

The same weaknesses appear in our own country, where titles and responsibilities are not hereditary, but where wealth is inherited. The gifted poor may rise to affluence, by meeting the tests of life ably, but no method has yet been provided for assuring the economic reduction of incompetent deviates among the offspring of the rich. A trust company may keep a fool wealthy as long as he lives.

This biological variation of offspring of gifted parents from the parental norm, due to heterogeneity of traits among remote ancestors, means that a system of education, of social privilege, of economic reward, or of political responsibilities, founded solely upon prescribed kinship, must eventually deteriorate from its original usefulness. Caste determined in the ancient manner is not a very reliable method of conserving gifted individuals for social functions.

III. MENTAL TESTS AS A MEANS OF CONSERVATION

We know as a result of verifiable experiments, carried out for more than a decade, that we can select for special educational opportunity children who are able to make use of it. We can select children who can carry unusual responsibility to the school. Present indications are very strong that by mental tests it will eventually be possible to select individuals who have extraordinary capacity to lead, rule, and advise mankind.

Although psychological science could undoubtedly bring such selection within the range of practicability, it is rather improbable that such methods will ever be put actually into operation. Powerful forces, like general ignorance, parental prejudice, jealousy of rivals, and sympathy, stand in the way. It is scarcely conceivable that human nature will ever estab-

lish and support a social-economic system based upon the impersonal data of mental and physical tests. The procedure would call for a clear rationality, which at present certainly seems superhuman.

It is true that in time of war the military population underwent mental and physical tests and were governed by the results in regard to office, responsibility, and emolument. It is possible, though highly improbable, that under circumstances threatening similar miseries, the civilian population also could be administered on such a basis. Such a circumstance might be growth of the population to a point where misery could be averted or postponed by severe social economy.

However, all things considered, speculation would lead to the conclusion that now, and perhaps always, mental tests will be applied merely as an auxiliary in educational and social affairs. The irrational forces which have so largely shaped human institutions in the past will act still as the chief determinants. Nevertheless, even as an auxiliary to human longings and passions, the influence of mental tests will be very great. For a long time to come, and perhaps permanently, tests will be allowed to exercise their power for prediction chiefly in the field of education, in dealing with the young. The school, under the supervision of informed persons, can insist upon administering education in accordance with educability.

IV. EDUCATION AND SOCIAL FUNCTION OF GIFTED GIRLS

The more widely mental tests are used the more certainly does it appear that general intelligence is distributed regardless of sex. This discovery raises interesting questions of public policy in reference to gifted girls and women. Until recently, that is until about five decades ago, the intellectual inferiority of girls was assumed, and public policy with regard to them

fostered no expectation of intellectual performances on their part. Their social function was grounded in physique rather than in intellect, to produce the species, and to perform manual duties pertaining to and compatible with maternity. In short, the social function of women was to produce the socii. Girls were assumed to be mentally inferior to boys, as a sex, and to resemble each other closely in intellectual caliber. In illustration of this theory of female homogeneity we find in a panegyric on Murdia,[1] dating from the second half of the first century, the sentiment expressed that the gravestones of women must all be alike, "Because their virtues admit of no heterogeneity, and it is enough that all have shown themselves worthy of the same good report."

Psychologists have discussed very little the educational and social implications of the demonstrated existence of intellectually gifted girls. Perhaps this is because the older attitudes toward girls and women had already been much modified by social-economic trial and error, before mental tests proved the existence of gifted girls. Girls had been admitted to collegiate education fifty years before mental tests were first applied to classify school children.

However, a certain value attaches to the demonstration by mental tests, which did not attach to the demonstration by scholastic tests. The former are known by the expert to be much more precise and objective than the latter. Strictly comparative groups are more easily secured for mental tests. Thus, in Germany, the psychologists, Peter and Stern, have called attention to the fact that girls' and boys' records in mental tests are equally good, and have asked what this means for education.

Is the implication of these facts that gifted girls should be given the same educational advantages as gifted boys? The

[1] Quoted by L. T. Hobhouse, in *Morals in Evolution*. (Holt.)

answer to this question is to be sought much more widely than in the data from intelligence tests. It must come from human psychology as a whole, from human physiology as a whole, and from the whole nature of the environment in which man lives. A part of the answer must be derived from each of these determinants. To narrow the inquiry abruptly, we may say that the answer to our question depends upon whether the differentiation of labor can proceed into a third stage of evolution, in which women will perform work in accordance with individuality instead of in accordance with sex.

The world's work has apparently passed through two stages in differentiation. The first was the division of labor between the sexes — all work being classified into two categories, men's work and women's work. Then gradually men's work became differentiated into all the various trades, callings, and professions which men now follow, in accordance with individual endowment. In 1920, the federal census of the United States listed twenty thousand distinct kinds of work, each with its own peculiar preparation. Most of these varieties of occupation are what is now ordinarily termed "men's work"; but a considerable variety begins to appear in "women's work," also; and in nearly all of the occupations listed, some members of both sexes are likely to be found. Even in nursing and in cooking men are engaged, while women are found even among aviators and mariners. Many able students of human society believe that these are signs of the advance of mankind into a third stage of social economy, in which women will perform specialized work, just as men now do, following useful professions, trades, or unskilled labor, in accordance with biological endowment.

Stated briefly, "the woman question" is how to reproduce the species and at the same time to work, and realize work's full reward, in accordance with individual ability. This is a

question primarily of the gifted, for the discontent with and resentment against women's work have originated chiefly among women exceptionally well endowed with intellect.

Gifted women seek constantly for the solution of their problem. An increasing number are found who marry with the intention of carrying on a profession. Some are found who marry, produce children, and continue a professional career. In an attempt recently made to study by analysis the elements contributing to success in such a combination, it was not very difficult for the investigators to find in New York a hundred cases, to serve as a sample. Still, it is doubtful whether the children are very numerous or the work unrestricted in scope, under conditions as at present achieved.

The soundest and most nearly just policy for education is probably that which prevails among us to-day. This policy is to admit gifted girls to all kinds and all ranges of education, and leave it to them to work out the division of labor, and its compatibility with the other demands of life, as well as they are able. It seems reasonably clear that gifted girls will have to solve their own problems, and from the results of mental tests applied to them during the past decade, there seems little cause for doubt that gradually a solution will be found, which will be satisfactory from a social point of view, and also to gifted girls themselves. This solution will probably come through specialization of what is now known as women's work, so that the care of very young children will be expertly undertaken; through knowledge of birth control, with rational limitation and spacing of offspring; through the gradual evolution of a public expectation favorable to the appointment of mothers in posts of conspicuous responsibility. All of these factors are already exerting influence and achieving respectability in contemporary life, largely through the efforts of gifted women who comprehend their problem.

V. CAUSES AND EFFECTS OF THE DIFFERENTIAL BIRTH RATE

In our discussion of family history of the gifted, it was noted at some length that parents who are capable of producing gifted children have very small families. It was noted also that the gifted themselves, as represented by men of science, have few children. To this may be added that college graduates scarcely reproduce themselves. Students of the problems of population agree that the birth rate in civilized countries has become highly differential, favoring the disproportionate increase of mediocre and stupid persons. Hart, who has studied differential fecundity in Iowa by very careful statistical methods, concludes that the population of that state is growing less intellectual, generation by generation.

> The types of individual, then, who are becoming parents most extensively in Iowa are the tenant farmer, the foreigner, and the badly educated. The types most meagerly participating in the bearing and rearing of the next generation are the economically successful, the native born, the highly educated, and the city dwellers. These differences in fecundity are so radical that they cannot fail to have a profound effect upon the types of children produced, upon the sort of home and community environments provided for them, and hence upon the trend of character of the Iowa population.

Various students have tried to determine the reason for the differential birth rate and its probable effects upon the quality of the future population. They have in the main concluded that the causes are primarily psychological. The voluntary restriction of families of men of science has already been referred to, in connection with Cattell's study of this group. Highly intelligent persons simply do not want to have many children, and at the same time they are quick to learn how to avoid what they do not want. Very possibly it is true that human beings of all degrees of intelligence would choose to have few rather than many children. The differential birth rate may be wholly due to the greater capacity for learning of the intelligent and not to any difference in motivation.

There has been much fallacious reasoning in attempts to throw light upon the causes of restricted birth rate. One hears it said that the birth rate is reduced by comfort and wealth, for instance, whereas it is fairly obvious that this is probably an exact reversal of cause and effect in thinking. Inquiry into the motives of family limitation among parents of the gifted has not been put on record, doubtless because the whole subject of procreation is considered too personal for investigation. The men of science who gave their motives for family limitation in response to Cattell's questionnaire, mentioned chiefly conservation of health and of income. For highly rational persons these are certainly powerful motives. The intelligent are characteristically thrifty and hygienic in the conduct of their lives. Eugenics might, perhaps, make an effective personal appeal to the very intelligent, if a way could be found to render childbearing beneficial to health and economic security. Aside from statistical inquiry, it might well be presupposed that whatever would render reproduction less painful and less expensive would render it also more frequent among the most rational persons.

Another psychological factor of weight may be that the intelligent arrive with greater difficulty at a satisfactory explanation of the universe than do the unintelligent. Perhaps they cannot so easily fit procreation into the philosophy of life. Many of the sanctions and acquiescences which ordinarily appeal, are likely to be questioned by them.

We have already referred to the special motives which might be expected to actuate gifted women in restricting population. The strong instinctive drives for self-assertion, construction, and satisfaction of intellectual curiosity which characterize the gifted, are incompatible with the demands which repeated maternity usually entails. The argument that "selfish interests" should be sacrificed for the good of the next generation

seems inane, if not positively satirical, since the children for whom they are thus asked to give up their activities may be girls, who in turn must sacrifice their lives for the same purpose, and so forth in a vicious circle, endlessly. Nor is the fact to be forgotten that a very gifted woman has small chance to replace herself by her sacrifice with a son or daughter equal to her in capacity, as is known from the laws of filial regression.

For a gifted woman to have children means that she must incur pain, a certain statistically determined risk of health or of life, rigorous restriction of activity, and inhibition of the strong self-assertive drives which are called personal ambition. Highly intelligent persons are not at all likely to come under the influence of the usual devices of social control in this matter. They will no doubt prefer to restrict their offspring to a number that will leave them at least some opportunity to follow their intellectual interests and to realize their self-assertive impulses. Moreover, they may well feel that they owe it to their offspring to set an example of a life worth living, especially in the case of those who may be girls. These needs and attitudes of gifted women have been very little studied in attempts to derive the causes of the differential birth rate. They have been noted occasionally, however. Since gifted men tend to marry gifted women, these needs and attitudes tend strongly to influence the procreation of the former as well as of the latter, in modern life.

All things considered, it will certainly be very difficult to supply effective motives for increased procreation by the intelligent. Very probably the present trend of differentiation will continue, offspring being born in inverse proportion to the power which their parents have of learning how to limit reproduction. This will lead to a slow shifting downward of the intellectual norm of the population. It will, of course, take a long time for this effect to become very marked. Any

shift in the norm of a great population requires the passing of generations, and there are only about three generations to a century, in a family.

VI. THE ECONOMIC REWARD OF INTELLECT

What is and what should be the economic reward of intellect? What is the correspondence between income and intelligence the world over? Precisely opposite answers are given to this question by competent thinkers. We often hear it said that intellectual workers are underpaid, obtain but a miserable pittance. On the other hand, it is charged that members of the learned professions oppose socialistic politics through self-interest purely, because under such a régime they would lose the relatively large incomes which they now enjoy.

These opposite views, that those who live by expert thinking are relatively poor and that they are relatively rich, show simply that the facts have not as yet been established by a straightforward correlation between income and scores made on intelligence tests. There is at present no eyewitness to the facts. We can only reason from circumstantial evidence, which tends to indicate the probable correlation.

In attempting to infer the relationship between intellect and reward, we cannot, however, confine our consideration to members of the learned professions. We must bear in mind that the management of commerce and of industry undoubtedly requires very superior intelligence. Business executives and proprietors perform work which clearly calls for abstract thought and for power of complex planning. In addition to these, there are other occupational groups which would probably "test high." Gamblers and those who "live by their wits," for instance, are probably intelligent, though they may be unworthy in other respects.

Nor is income of money the only item to be noted, in de-

termining the economic reward of intellect. Leisure must be considered and freedom from routine. Correlations between money and intellect, leisure and intellect, freedom and intellect respectively, would have to be calculated.

Turning now to such evidence as we have, we know that if reward is in positive correlation with intelligence, a large proportion of the world's wealth will belong to a small proportion of its population. This is certainly the case in civilized countries where statistics of wealth are kept, and where effort is freely competitive. Income in the United States, for instance, is distributed so that only a few persons receive very large amounts. The income tax, levied at present chiefly upon incomes of more than two thousand dollars per annum, is paid by a small percentage of people. The same principles of distribution apply to capital. A large number of people "own a little property," a few own huge amounts, while a corresponding few have nothing at all and are classed as paupers. This is roughly what we must find, if economic reward is correlated positively with intellect.

But can we infer that the few who own most and receive most are really those who are most richly endowed with intellect? We have, in the first place, the established fact that children who test as gifted and who are the best learners at school, are usually derived from parents with superior incomes. It has been proved that only a small minority of such children come from poor homes. We know, also, that in all traits so far measured, children show a strong resemblance to their mid-parent. From these data we may logically reason that the parents of gifted children are themselves gifted, and that their superior incomes point to a positive correlation between wealth and intellect. In further pursuance of this line of evidence, it has been proved that in American private schools, where parents must pay a tuition fee amounting to practically the total an-

nual income of an average family in the United States, the intelligence of the pupils is so superior that a child of 100 IQ cannot hope for success in the competitions of learning.

At the opposite extreme of income, we have paupers; and here we have actual test knowledge of intelligence. Paupers are very stupid as a group, including few persons of better than average mental capacity. A lengthy bibliography of scientific studies exists, to establish this fact beyond a doubt. We do not have to rely upon inference from the intellectual status of their children, which, we may note in passing, is also low.

We ought now to examine the few available data which show the ratings on intelligence tests of various occupational groups, in conjunction with the wages and salaries of such groups. Such ratings according to army tests were shown in Figure 25, and these have been independently confirmed in the main by investigators who have given intelligence tests to supplement the army data, including some occupations not tested among drafted men. Those testing in the higher groups, professions, and technical pursuits, unquestionably receive a greater economic reward than do those testing in the lower groups, semi-skilled and unskilled labor. The former receive salaries; the latter, wages. The former, if employed by others, work on appointments which are annual or which involve permanent tenure. The latter work by the day, the week, or the month. The earning power of the former lasts much longer than does that of the latter, who must cease to earn when physical strength declines. For all these reasons, earned income is higher for those who test higher intellectually. Income derived from sources other than earnings may be, and probably is, higher for them, also, but there are hardly any data on which to base an inference in regard to this.

In the matter of leisure, professional persons and the technically trained also receive much the greater reward, as is also

true of freedom from routine. Manual workers have very little paid vacation. These findings as to the much more advantageous economic situation of the professionally and technically educated, have led to much fallacious thought and propaganda. It has been urged, for instance, that all children should be obliged to attend high school, because statistics prove that high school graduates have larger incomes than do those who have not been graduated from high school. The fact rather obviously is that those who are intelligent enough to follow the occupations, entrance to which is through high school, are also intelligent enough to obtain superior economic rewards. It is not the high school education which wins the reward, but the person, who is able to win both the education and the reward.

From evidence such as we have at present we may reason that there is a positive and fairly high correlation between intellect and economic reward, wherever competition for such reward is free, or relatively free, for all. Nevertheless, there are many factors at work from which we should expect imperfect correspondence between the two, even among persons of the same sex, race, and age. In the first place, intellect is not the only human trait which has economic value. Health, strength, industry, manual skill, and many other phases of a man's equipment are worth money, and these are by no means perfectly correlated with intelligence. Thus in some situations manual capacity in a man of inferior intellect may be worth more than the intelligence of a superior man. The musical ability of a person mediocre intellectually may draw a greater reward than excellent ability in abstract thinking.

Also, there exist certain artificial restraints upon competition in most civilized societies. All such restraints operate to reduce the amount of correlation between intelligence and economic status. Union wages, fixed salaries, as of civil

servants, and like devices for restraining differentiation of reward, tend to equalize the stupid and the intelligent in this respect.

If, moreover, we do not limit the correspondence to one sex, to one race, or to one age, but include persons of both sexes and of various races and ages, the correlation will be still further reduced. This will be the case because age, race, and sex are in themselves important in determining a person's economic value. A child, an inexperienced youth, a mature adult, and a septuagenarian, all of the same rating on intelligence tests, will be of equal worth for scarcely any purpose. A given woman of the same intellectual caliber as a given man is not of the same economic value as the latter, because masculinity is in itself an asset of superior worth.

The inheritance laws, furthermore, tend to keep down the correlation between intellect and wealth. We have said that a trust company may keep a fool rich as long as he lives. The possibility of inheritance of money by the relatively stupid, under guardianship of the competent, legally constituted and supervised, is perhaps the single most significant restraint of economic reward in its tendency to gravitation toward the superior. Inheritance without guardianship is no such restraint, for superior intelligence is undoubtedly required to conserve money, as well as to accumulate it in the first place. A fool and his money are soon parted, unless a trust company intervenes.

Another fact which reduces correlation between intellect and income is that many of the best thinkers prefer to do what they enjoy instead of what is most profitable economically. For instance, Child C, of IQ 190, described in Chapter IX, reached a compromise in his thinking about future occupation, between what is most interesting and what is most profitable, by determining upon a medical career. The most

interesting career would have been that of astronomer. The most remunerative would have been in connection with Standard Oil. The most remunerative was rejected, in favor of that which combined an interest of secondary importance with the possibility of moderate wealth. But many others of like IQ will not compromise at all, preferring the relatively unremunerative career of an astronomer to a career in which they might accumulate ten million dollars. Again, it has been shown that the gifted are rated above the average in kindliness and sympathy. Very probably these traits would act as an influence to restrain them from the full exercise of their advantage, in economic situations where ruthlessness is likely to be a factor in success.

Thus all the evidence which we have leads to the conclusion that at present superior intelligence obtains a superior economic reward in competitive societies, though not perfectly apportioned increment by increment. The intelligent have good incomes, and as a group require no paternalistic supervision. To be sure, many a man of high intelligence quotient, with an income only a hundred per cent above the average for the population of like age, may complain that intellect is underpaid, because he sees others whom he knows to be less intelligent receiving much larger incomes from other lines of work which he has renounced in favor of his interests. Thus we sometimes hear the complaint that teachers, physicians, research workers, and the like are poorly paid. It is true that they are poorly paid as compared with those of equal intellect who devote their energies to the management of materials instead of to the management of ideas; but as compared with the average of the population, they are not poor.

A competitive social economic system does, so far as we can infer from present data, foster the interests of the intelligent through making it possible for them to obtain economic goods

by the exercise of their powers. Such a system thus secures the full services of the intelligent, for the common use. These services could probably not be secured in any other way, human nature being what it is. Not even intellect is likely to work hard and long for nothing.

Whether the works of the most intelligent — invention, discovery, legal regulations, and the like — are ultimately desirable is certainly a matter of opinion. But if they are desired, a competitive social-economic order, in which economic reward comes as a result of their labors to those who are the best thinkers, seems effective. Intellectual workers "retire," as others do, when they have achieved economic security on a level which satisfies them.

It may appear that the discussion has wandered from the subject of this volume, gifted children. Its pertinence consists in its bearing upon the future outlook for such children. In educating them, we try to look forward into their future and to determine whether society is well constituted to receive them and to provide just conditions for mutual gain. If educators, as guardians of the intellectual life of gifted children, should find the social order to be faulty in its relation to its most intelligent members, it would be proper for them to offer suggestions for improvement.

Conditions under which intellect can get what it wants by working competitively to supply social needs, seem just and mutually profitable. These are the conditions which actually obtain, apparently, from such evidence as we can gather. Abolition of existing artificial restraints upon differential reward would, of course, further the interests of the gifted. Abolition of inheritance under trust or permanent guardianship, and the forbiddance of standardized wages would thus be improvements from this point of view. However, it may be that from some other point of view of equal merit for the social

weal, a preponderance of good is to be achieved by the continued sanction of such restraints. The matter is very complicated, for intellect is not the only valuable trait in human affairs. It is, nevertheless, that which plays the leading part in differentiating man's life from the life of other organisms on earth.

One who comprehends at first hand the facts which we have endeavored to discuss in this volume, has insight into the failure of realization, which has been the common lot of various schemes proposed for economic Utopia. These schemes do not found themselves on the existing distribution of biological endowment. Their authors do not always remember that men have for their sustenance only that which they are able to obtain from the earth by mental and physical labor, and apparently they do not know that only a few men have, or ever can develop, sufficient power of thinking to secure large surplus returns for their labor. The immemorial division of mankind into "lower," "middle," and "upper" classes, economically speaking, rests on a biological foundation which guarantees the stubborn permanence with which it persists in spite of all efforts to abolish it by artifice.

Attention has been called to the fact that intellect is not the only human trait that is valuable for subsistence. Manual power as such is also of economic importance. It might be argued, therefore, that there can and should be what Carver calls occupational equality — that the manual trades can and should be as prosperous as the learned professions.

> If those who ply one occupation were about as prosperous on the average as those who ply any other occupation, there might be said to be equality among the occupations.

Such occupational equality, says Carver, "is desirable, if it can be attained." One who has become a student of the

researches upon which our discussion of gifted children is founded, will be compelled to doubt the possibility of such economic attainment. The inequality between the mentally typical ditch digger and the mentally typical engineer lies ineradicably in the fact that the latter can perform the work of the former, if he wishes, but the former can never perform the work of the latter. The mentally gifted can learn to perform any kind of work, at will or at need, through the whole gamut of occupations, for as a group they are physically as well as mentally superior. At need, a gifted man can even perform his professional tasks and do his own manual work also. The millions at and below mediocrity cannot do likewise. They cannot carry on their manual tasks and at the same time serve their own needs in the fields of expert thought, such as medicine, surgery, law, education, chemistry, international diplomacy, religion, and the management of commerce.

There is no minimum occupational level defining a lower limit for the mentally best, but there is a maximum occupational level marking an upper limit for all except the best. The greater reward accrues, therefore, to the professional thinker, not because his function is more necessary for the common subsistence than that of the manual laborer; but because only a small percentage of persons born can learn to do his work acceptably, while nearly all people can learn to do adequately the work of the manual laborer. Socially desired work that can be learned by ninety-five persons out of a hundred will probably be forever cheaper than work that can be learned by only one or two in a hundred.

The influence of this factor of *rarity* upon income and prestige is not at all well comprehended by those who propose schemes for modifying the economic order. The extreme *rarity* of high degrees of intelligence is not recognized. Bertrand Russell exemplifies the general neglect of this factor

in his recent discussion of education as it might be under socialism.

> Take, for example, the medical profession. Of necessity, the training for this profession is long and arduous: we do not wish our lives to be at the mercy of people ignorant of anatomy and physiology. At present the length of the training operates to raise the social level and diminish the number of those who can qualify. Under socialism this would not be the case. . . . There would be no need to pay doctors more highly than laborers because, probably, a sufficient number of people would prefer a doctor's life to a laborer's. . . . Doctors would not be thought superior to laborers, but only men with different tastes. Both are necessary to the community, and therefore both are deserving of respect, but not one more than the other.

Russell does recognize the peculiar value of rarity, but fails to determine correctly what the rare element really is, in the situation considered by him. He says:

> Respect is paid to what is rare; make merit common, and it will win no special respect. Under socialism I should hope to see learning so common that it would be unregarded.

Again he says:

> Every boy and girl would be given as much education as the authorities judged desirable, quite regardless of parents' means.

The mistake here lies in assuming that merit can be made common, and that boys and girls can assimilate as much education "as the authorities judge desirable." One who has become thoroughly familiar with the researches upon which this volume is founded will realize that children will not be given as much education as authorities deem desirable, but will be given only the limited amount that each can take, even under a régime such as that proposed. Those who can take the thorough training of a first-class physician or surgeon will be few. The rarity which commands superior income and respect will, therefore, continue to exercise its influence, however education may be administered; for it is inherent rarity, not adventitious rarity, that is in question.

VII. SCHOLARSHIPS

There is an important phase of economic support which has to do directly with the childhood of the gifted, and that is the matter of advanced education for those whose parents cannot or will not afford it. Evidently in the United States at the present time a very large majority of gifted children need give no concern on this account. Their parents are themselves educated persons of ample means, who take it as a matter of course that their children will receive higher education at their expense. So true is this that it is somewhat difficult to find in this country a child testing at or above 140 IQ who needs a scholarship for purposes of continued education. Such children do, however, exist. Their proportion has never been statistically determined, but it is perhaps approximately one in twenty-five. That is, among children in the United States testing at or above 140 IQ, it seems reasonable to infer from present knowledge of parental status, that about every twenty-fifth one has to leave school to go to work.

Of the gifted who are thus compelled to discontinue their education, a number certainly work their way to it subsequently, and arrive somewhat belated at their appointed goal. Others may be permanently side-tracked from the careers which would have been of most mutual benefit to themselves and to society. We shall have more exact knowledge of the extent to which this happens, when the subsequent histories of tested children shall have been studied, during the decades about to ensue.

The time-honored method of providing for the education of the needy gifted has been through scholarship funds. Award of such funds is at present usually made on the basis of examination in school subjects, teachers' judgments, letters of recommendation from sympathetic persons, or mere poverty

of the child, regardless of other considerations. For instance, one private organization, the purpose of which is to maintain poor children in school on scholarships, confines its inquiries in making award to the economic condition of the child. It does not inquire concerning the relative scholastic rating or the native endowment of the candidate, assuming all children to be equally well adapted to secondary education. Awards made in this manner steal away the original meaning of the term "scholarship fund."

No doubt scholarships should be awarded eventually on the basis of mental tests, instead of by the comparatively haphazard methods which prevail. If children leaving school to go to work could be given mental and physical tests, as was done for years in Cincinnati, scholarship funds could be apportioned according to ability for using them to advantage. This, it will be recalled, was one purpose of the mental survey in Northumberland carried out by Thomson. The educational authorities wished to determine thus the extent to which methods in vogue were failing to make the best award of scholarships.

By experiment it might be shown that physical as well as mental tests should be taken into account in making awards. A comparison extending through several years of scholarships held on such a basis, and of scholarships held by the criteria ordinarily used, should certainly be instituted to discover the relative achievement of holders in the two groups. By means of such experimentation educators will become able to advise the best investment of the limited funds available for scholarships.

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